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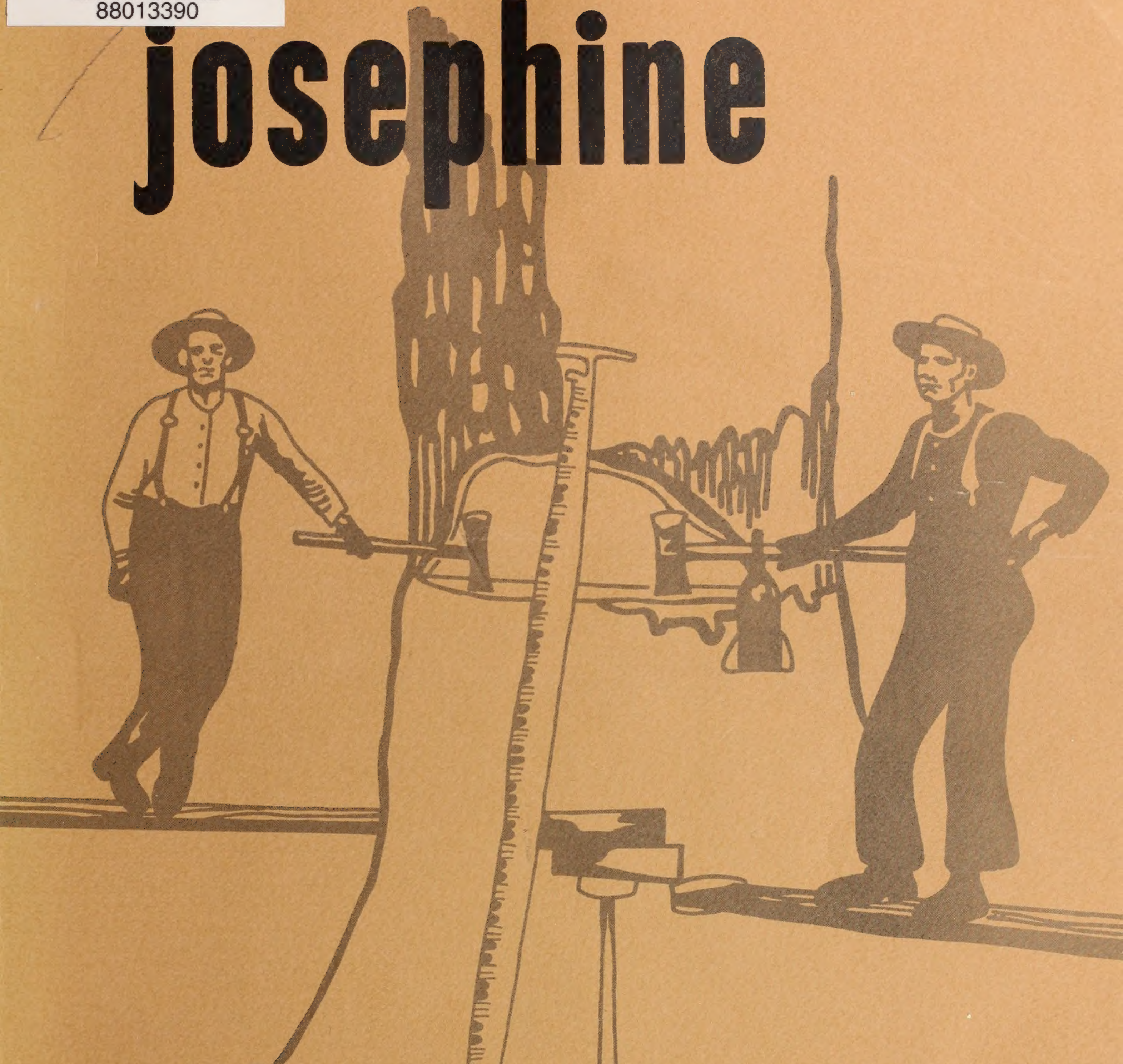

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DEPARTMENT OF THE INTERIOR

DRAFT

ENVIRONMENTAL STATEMENT

INT DES 78-4

JOSEPHINE SUSTAINED YIELD UNIT

TEN-YEAR TIMBER MANAGEMENT PLAN

Prepared by

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

State Director, Oregon State Office

Bureau of Land Management
Library
Denver Service Center

SUMMARY

Draft (x)   Final ( )   Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ( )

2. Description of the Action: The Bureau of Land Management proposes a ten-year timber management plan for the 425,720 acres of public land in the Josephine Sustained Yield Unit of the Medford District (Oregon). Proposed annual timber harvest is 20.67 million cubic feet (106 mm bd. ft.), consisting of 94 mm bd. ft. as sustained yield allowable cut from high intensity forest management land and 12 mm bd. ft. as trial harvest from low intensity forest management land not included in the sustained yield computation base. Treatments implicit to the proposal include road construction, harvest employing predominantly shelterwood systems with some clearcutting, slash disposal, site preparations predominately with herbicides, planting of trees, herbicide release of established plantations, precommercial thinning, fertilization, and commercial thinning.

3. Summary of Environmental Impacts: This proposed action would reduce annual timber harvest from the Josephine SYU by 7.96 million cubic feet (40 mm bd. ft.). While employment in logging and associated log manufacturing is cyclic, dependent on national demand for wood products, approximately 370 jobs would be lost. Annual revenue distributed to the O&C counties would decline about $3.3 million based on recent stumpage values. The lesser harvest would reduce present level direct impacts on climate, soil, and water quality. Increased intensity of forest development practices would increase impacts on air quality, vegetation and animals associated with the old growth forest. Potential for impacts on air quality, water resources and aquatic animals and vegetation are possible, but not probable, due to application of herbicides and fertilizer. Degree of impact on previously unidentified cultural resources is dependent upon success of pre-disturbance cultural resource surveys which are part of the proposal.

4. Alternatives Considered:

   A. Timber Harvest Alternatives

      - No Control of Competing Vegetation
      - Limited Investment in Timber Production
      - Utilization of Surplus Inventory
      - Forestry Program for Oregon
      - No Action

   B. Non-Harvest Alternatives

      - No Timber Management Program
      - Substitute Sources
      - Substitute Materials

5. Comments Will Be Requested From: (See attachment on next page.)

6. Date Draft Statement Made Available to EPA and the Public:

MAR 3 1978

Federal Agencies

Advisory Council on Historic Preservation

Department of Agriculture
- Forest Service
- Soil Conservation Service

Department of Defense
- Army Corps of Engineers

Department of Energy
- Bonneville Power Administration

Environmental Protection Agency

Department of the Interior
- Bureau of Reclamation
- Bureau of Outdoor Recreation
- National Park Service
- Fish & Wildlife Service

Pacific Northwest River Basin Commission

Small Business Administration

Water Resources Council

State and Local Government

Oregon State Clearing House

Oregon State Historic Preservation Officer

Oregon State Department of Forestry

Boards of County Commissioners
- Coos County
- Curry County
- Douglas County
- Jackson County
- Josephine County

Rogue Valley Council of Governments

Interest Groups

Association of O&C Counties
Audubon Society
Friends of the Earth
Headwaters Association
Izaak Walton League
Josephine Conservation Coalition
League of Women Voters
Motorcycle Riders Association
National Resources Defense Council
Nature Conservancy
Northwest Environmental Defense Center
National Wildlife Federation
Oregon Student Public Interest Research Group
Oregon Wildlife Federation
Oregon Guides & Packers Association
Oregon Environmental Council
Rogue River Guides Association
Sierra Club
Wilderness Society
Wildlife Management Institute

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FOREWORD

This environmental statement has been prepared pursuant to Section 102 (2)(c) of the National Environmental Policy Act of 1969 (NEPA). It describes and evaluates the ten-year timber management program proposed for the Josephine Sustained Yield Unit (JSYU) in southwestern Oregon (Figure F-1).

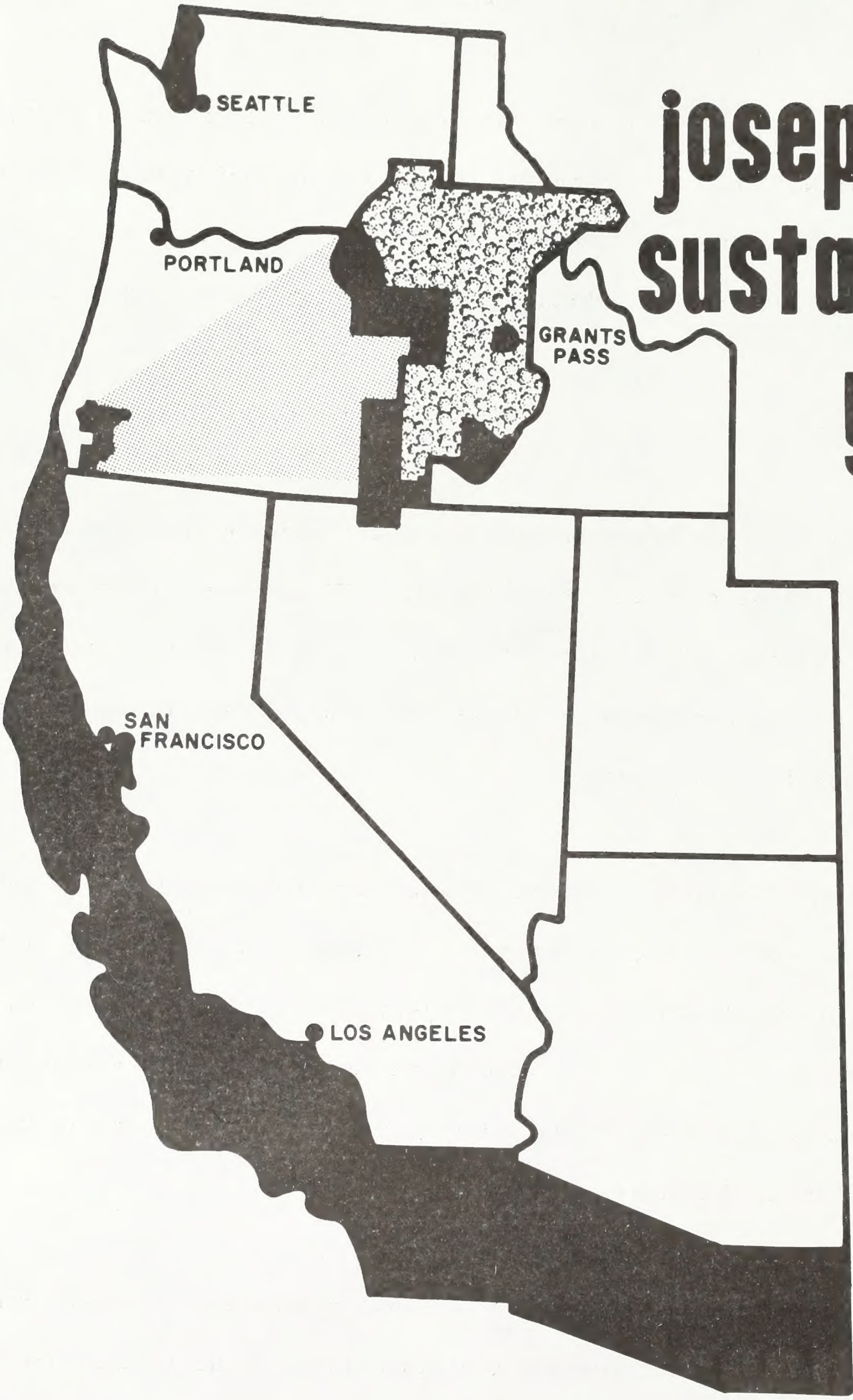
PURPOSE

Adoption of a new timber management plan based on land use allocations and forest reinventory within the Josephine SYU has been determined to be a significant Federal action under the NEPA. It is the purpose and intent of the Bureau of Land Management to assess all implications of the action through this full disclosure document.

This is the first in a series of environmental statements on timber management planning in western Oregon. A timber management plan is formulated by application of the Bureau planning system and various inventories which supply a data base for land use allocation decisions. Each component employed--planning system, inventories, and proposed decision--is explained and quantified in the statement.

Final decisions with regard to land use allocation, ten-year timber management activities and sustained yield allowable cut in the JSYU will be made only after a final environmental statement has been filed with the Environmental Protection Agency (EPA).

Figure F-1



josephine sustained yield unit

SCOPE

The proposed actions described in this environmental statement include all development, protection, harvest and transportation practices carried out to produce raw material to help meet the nation's wood product needs.

A previous statement (FES 76-49 filed with the Council on Environmental Quality September 24, 1976) dealt with the timber management program throughout the Bureau of Land Management. Due to the smaller area of consideration, the Josephine statement can provide greater detail than was possible in FES 76-49. However, ultimate site specificity can be gained only in an analysis of a particular proposed timber sale or timber management practice on a given area.

Timber management is only one component of the Bureau's forest management effort in the JSYU. This statement does not explicitly address itself to those practices or actions carried out for the specific interest of other forest values or uses. Recreation, esthetics, minerals, wildlife, water quality, livestock forage and other resource values of the forest are described only in terms of how they are impacted by or impact timber management practices.

Certain specific practices of the proposal, such as road construction and fire protection, may affect other land uses in the forest. In this statement these practices are described in the context of their applicability to timber

Typical old growth stand following regeneration cut of a two-stage shelterwood regime.

management since the primary purpose of the proposal is the management and protection of the timber resource.

APPLICABLE AUTHORITIES

A landmark law of singular importance to the proposal is the Revested Oregon and California (O&C) Railroad and Reconveyed Coos Bay Wagon Road (CBWR) Grant Lands Act of 1937 (50 Stat. 874; 43 USC 1181a., et seq.). This legislation was the first to specify sustained yield management for Federal lands under the principle of multiple use. It requires that O&C forest lands be managed for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating streamflow and providing recreation facilities. Approximately 89 per cent of the public land in the JSYU is O&C lands.

Intermingled public domain lands in the JSYU (approximately 11 per cent of the total) were brought under the same management principles by the Bureau's 1969 application to withdraw these lands from entry under all public land laws except the Mining Act of 1872. Withdrawal was completed by Public Land Order 5490 (40 FR 35:7450).

In addition, all actions of BLM are now governed by the Federal Land Policy and Management Act of 1976 (90 Stat. 2743; 43 USC 1701). This law, often referred to as BLM's "Organic Act," establishes policy for BLM administration of public lands under its jurisdiction. Five provisions of the act have particular application to this proposal.

-- Broad management authority under the principles of multiple use and sustained yield.

-- Periodic and systematic inventory of the public lands and the resources they contain.

-- Comprehensive land use planning.

-- Protection of scientific, scenic, historical, ecological, environmental, air and atmosphere, water resource and archeological values.

-- Continued application of the O&C Act insofar as it relates to management of timber resources and disposition of revenues from lands and resources.

Numerous other laws also apply. The more significant of these are listed in Appendix A. The Glossary of Terms (Appendix T) will be helpful to readers unfamiliar with timber management terminology.

1. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is a ten-year timber management plan for public lands administered by the Bureau of Land Management in the Josephine Sustained Yield Unit. The proposed annual harvest is 20.67 million cubic feet (approximately 106 million board feet Scribner log rule). This amount is 40 million board feet less than the present annual harvest level. A comparison between the proposed and the present ten-year timber management plan may be found in Section 1.9.

1.1 OBJECTIVES AND POLICY

The general objective of the proposal is to achieve Congressional intent as set forth below. The inventory, analysis, and land use allocation process are intended to assure that the proposed decisions and proposed level of harvest are in compliance with the law.

Congressional direction regarding sustained yield is contained in the O&C Act of 1937, which requires that these lands

> ". . . shall be managed . . . for permanent forest production, and the timber thereon shall be sold, cut and removed in conformity with the principle of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities. . . "

The O&C Act specifically requires the determination of the annual capacity for timber production with sales, or offers for sale, of timber to be in quantities not less than the determined amount.

The Federal Land Policy and Management Act of 1976 establishes operational objectives for public lands administered by BLM. Section 102 states the policy of the United States for lands, including the following:

> ". . . goals and objectives be established by law as guidelines for public land use planning, and that management be on the basis of multiple use and sustained yield unless otherwise specified by law."

In Section 103(h), sustained yield is defined as "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands consistent with multiple use."

Allowable cut planning is undertaken periodically to determine the undiminishing sustainable level of harvest from lands used for timber production. Normally the determination cycle is every ten years, but it may occur more often in the event of change in land use, forest condition or technology.

All technically feasible, economically justified and environmentally acceptable intensive forest management practices that are foreseeable in a 20-year planning horizon are anticipated in computing the sustained yield level. Computations recognize intermediate harvests, e.g. thinnings, as an

element of the allowable cut. The present and future effect of the adopted practices upon forest productivity is immediately reflected in the determination of annual harvest. This factor, often referred to as allowable cut effect (ACE), allows for immediate recognition of future growth levels which will occur in a managed forest.

The objective of the trial harvest program from low intensity lands is to determine what practices might be effective to facilitate regeneration within the prescribed five-year period, and to gather empirical data on the actual regeneration period. No sustained yield allowable cut is proposed for the low intensity lands.

BLM has adopted the policy guidelines for timber management contained in the Senate Subcommittee on Public Lands report of 1972 entitled "Clearcutting on Federal Timberlands." The guidelines cover three issue areas; following is the summary from the Senate report:

<u>Allowable Harvest Levels</u>

-- Allowable harvest on Federal forest lands should be reviewed and adjusted periodically to assure that the lands on which they are based are available and suitable for timber production under these guidelines.

-- Increases in allowable harvests based on intensified management practices such as reforestation, thinning, tree improvement and the like should be made only upon demonstration that such practices justify increased allowable harvests, and there is assurance that such practices are satisfactorily funded for continuation to completion.

If planned intensive measures are inadequately funded and thus cannot be accomplished on schedule, allowable harvests should be reduced accordingly.

Harvesting Limitations

Clearcutting should not be used where:

-- Soil, slope or other watershed conditions are fragile and subject to major injury.

-- There is no assurance that the area can be adequately restocked within five years after harvest.

-- Esthetic values outweigh other considerations.

-- The method is preferred only because it will give the greatest dollar return or the greatest unit output.

Clearcutting should be used only where:

-- It is determined to be silviculturally essential to accomplish the relevant forest management objectives.

-- The size of clearcut blocks, patches or strips are kept at the minimum necessary to accomplish silvicultural and other multiple-use forest management objectives.

-- A multidisciplinary review has first been made of the potential environmental, biological, esthetic, engineering and economic impacts on each sale area.

-- Clearcut blocks, patches or strips are, in all cases, shaped and blended as much as possible with the natural terrain.

Timber Sale Contracts

Federal timber sale contracts should contain requirements to assure that all possible measures are taken to minimize or avoid adverse environmental impacts of timber harvesting, even if such measures result in lower net returns to the Treasury.

Policy relating to the selection and use of herbicides is contained in Departmental Manuals and reflected in standing Bureau instructions. All provisions of applicable Federal and State law will be adhered to.

Herbicides, when employed, are selected to meet a specific problem and used in minimum strength at minimum intervals. Feasible alternatives to

the use of herbicides will be investigated prior to a decision in favor of chemical treatment. No chemical will be used when there is a basis for belief that water quality will be degraded or that hazards exist which will unnecessarily threaten fish, wildlife, their food chains or other components of the natural environment. The annual herbicide projects proposed are submitted through an annual Departmental review process (described in Section 1.6.4.2) each year prior to approval of any project.

In addition, policy provides for maintenance of two lists by USDI --prohibited chemicals and restricted chemicals. Those on the prohibited list may not be employed under any circumstance. Those on the restricted list are used only when there is no alternative technique and then in relatively small scale application.

1.2 MANAGEMENT CLASSES

Analysis of inventory data disclosed wide variation in production capability of commercial forest lands in the JSYU. Three timber management classes reflecting this variation were identified through a series of procedures described in Section 1.4. Different management prescriptions are proposed for each management class.

Table 1-1 summarizes the proposal showing the area by management class, proposed annual harvest and prescribed management treatments to take place during the ten-year period. The order or sequence of treatments as listed is

TABLE 1-1
Summary of Proposal

a) Area by Management Class and Planned Annual Harvest

	Management Class: High Intensity Lands	Low Intensity	Limited Mgmt. Lands
Area in Class (acres)	222,896	55,675	79,471
Planned Annual Harvest in millions of cubic feet (million board feet Scribner equivalent)	18.39 (94)	2.28 (12)	none

b) Ten-Year Plan of Prescribed Management Treatments

Treatment	Approximate Area in Acres: High Intensity Lands	Low Intensity	Limited Mgmt. Lands
Transportation System			
Construct 500 miles of permanent road	3,940	400	unknown
Reconstruct 100 miles of existing road	0	0	0
Surface 50 miles of existing road	0	0	0
Shelterwood Harvest			
Regeneration Cut	36,000	5,000	unknown
Final Harvest Cut	9,000	0	(see Section 1.1.3)
Clearcut	5,000	none	none
Slash Disposal			
Burning	10,000	100	unknown
Gross Yarding (including machine piling)	30,000	3,500	unknown
Site Preparation			
Herbicide	33,500	1,000	none
Mechanical Scarification	160	0	none
Planting			
Replant or Interplant (existing non-stocked or understocked clearcuts)	9,200	0	none
Initial Planting (new clearcut or shelterwood regeneration cut areas)	41,000	0	none
Replant & Interplant (new cutting areas not adequately stocked by initial planting, includes areas receiving overstory removal)	12,300	0	none
Herbicide Release	13,200	0	none
Precommercial Thinning	14,200	0	none
Fertilization	18,900	0	none
Commercial Thinning	4,700	0	none

typical, although not every acre will necessarily receive the same combination of treatments. A discussion of treatments and sequence of treatments may be found in Section 1.6.

1.2.1 High Intensity Forest Management Lands

The high intensity category may also be referred to as the timber production base. These commercial forest lands are suitable for continuous timber production with reasonable assurance of successful results from the application of intensive timber management practices. Specific practices and actions shown in Table 1-1 will take place during the first decade. Operation at the indicated level is necessary to attain the computed undiminishing annual allowable cut of 18.39 million cubic feet (Section 1.5).

Approximately 26 per cent of the high intensity lands possess soil, topographic and climatic conditions suitable for clearcut harvest techniques. Regeneration can be accomplished within five years of harvest with standard artificial reforestation methods.

Approximately 74 per cent of the high intensity lands exhibit characteristics which would make regeneration within five years unlikely if they were clearcut. Two-stage shelterwood harvest technique is proposed for these areas. Establishment of a new stand can be accomplished within five years of the regeneration cut under this prescription.

1.2.2 Low Intensity Forest Management Lands

Low intensity lands are commercial forest land by definition since they are capable of growing in excess of 20 cubic feet of commercial coniferous species per acre per year. They are not included in the timber production base for allowable cut determination because the regeneration period is expected to be in excess of five years after clearcutting or after the regeneration cut of a shelterwood regime.

A trial management program for the first decade is proposed involving approximately 500 acres of low intensity lands per year. Planned annual harvest resultant from the trial management program is 2.28 million cubic feet during the one-decade trial period.

Due to the harsh site conditions, clearcutting would probably convert such areas to non-commercial forest classification. A two-stage shelterwood cutting system will be employed, and residual trees will provide shade and seed source to obtain natural reforestation following the regeneration cut. After reproduction has become established the final harvest cut will be made. It is unlikely that any final harvest cut will occur on low intensity lands in the first decade since it is not expected that regeneration will occur within the proposal period.

Implicit in the proposed trial management program is use of herbicides for site preparation in good seed years to assist natural regeneration, and

approximately 1,000 acres will be so treated during the trial period. No release spraying is anticipated.

Trials of other intensive forestry practices such as planting or thinning may be initiated on low intensity lands during the initial decade. No firm plans in this regard are available, however, and these practices are not part of the proposal.

1.2.3 Limited Forest Management Lands

Approximately 79,500 acres of commercial forest land have only limited forest management potential. These lands are characterized by shallow rocky soils, extremely droughty conditions resulting in severe regeneration problems, highly erodible soils, high water tables, and/or very steep slopes. Regeneration time, if these lands were logged, would be considerably in excess of five years, and artificial reforestation is not technologically assurable.

No planned annual harvest is proposed from these lands because of probable site degradation. Harvesting will be restricted to mortality-salvage or road right-of-way timber if it should become necessary to construct roads through any limited management land. No volume figure is projected or included in the proposal.

1.3 LOCATION

The Josephine SYU constitutes the western half of the Medford District, Bureau of Land Management. The SYU encompasses an aggregate area of over 850,000 acres, of which approximately 425,720 acres are public lands administered by BLM (Table 1-2). Portions of five counties are contained within the SYU (Figure 1-1, the folded map in the back cover pocket). The unit is bounded on the west by the Siskiyou National Forest and on the south by the Siskiyou and Rogue River National Forests; it abuts BLM's Jackson Sustained Yield Unit on the east. The northern boundary is conterminous with portions of three BLM sustained yield units -- South Coast, Douglas and South Umpqua -- and the Umpqua National Forest is at the northeast corner.

1.4 DETERMINATION OF LANDS INCLUDED IN THE PROPOSAL

The proposal includes all timber management practices necessary to sustain a yield of 20.67 million cubic feet per year during the initial ten-year period. Numerous steps as described below have been taken over a period of several years in developing the proposed action.

1.4.1 Inventories

Inventories provide information on the resources of the land and are conducted in accordance with BLM procedures, often based on research data of other agencies and institutions. The following sections describe inventories which have been accomplished in the JSYU.

TABLE 1-2

Land Jurisdiction in the Josephine Sustained Yield Unit

	ACRES[1]							
	Public Lands							
County	O&C[2]	PD[3]	Acquired[4]	Total	State Lands	County Lands	Other Lands	Total Area JSYU
Coos	2,228.06	--	--	2,228.06		--		2,228
Curry	36,358.32	40.05	207.33	36,605.70	--	--	1,329	37,935
Douglas	77,026.44	3,099.79	--	80,126.23	7,240	45	83,474	170,885
Jackson	12,492.09	2,799.03	--	15,291.12	640	--	16,872	32,803
Joseph-ine	250,957.48	38,943.81	1,567.22	291,468.51	7,470	28,030	286,024	612,993
Totals	379,062.39	44,882.68	1,774.55	425,719.62	15,350	28,075	387,699	856,844

Footnotes

1 Acreage figures for public lands are derived from BLM master title plats. Other acreage figures are BLM estimates.

2 Revested Oregon & California Railroad Grant Lands

3 Public Domain Lands

4 Lands acquired under authority of the National Wild & Scenic Rivers Act

1.4.1.1 Timber

Forest inventories in western Oregon are of two types, intensive and extensive. Intensive inventories include two classification systems to identify commercial forest land capable of producing timber on a sustained yield basis and lands amenable to acceleration of growth when subjected to specific practices. An extensive inventory samples commercial forest land for volume and growth rates to permit calculation of the allowable cut.

Timber Production Capability Classification (TPCC)

The Timber Production Capability Classification (TPCC) is an intensive inventory process initiated in 1972 to partition all public land administered by BLM in western Oregon into productivity categories. Categories are based upon the land's physical and biological capacity to produce timber. Table 1-3 shows the results of TPCC in the JSYU. Figure 1-2 is an example of a resultant aerial photo map.

The purpose of this classification is to identify commercial forest land which can be managed on a sustained yield basis as the timber production base for computation of the annual allowable harvest. As new data become available from intensive on-site analysis, management direction may be altered on specific tracts.

Table 1-3

Timber Production Capability Classification - 1972

Category		Acres	
Forest Land			399,649
Commercial Forest Land in Base		229,310	
Non-problem Sites	119,092		
Physical Problem Sites	23,249		
Reforestation Problem Sites	86,969		
*Commercial Forest Land Excluded from Base		135,146	
Physical Problem Sites	43,853		
Reforestation Problem Sites	91,293		
Non-Commercial Forest		35,193	
Non-Commercial Species	9,557		
Non-Commercial, low site	25,636		
Non-Forest Land			26,071
Total public lands administered by BLM in the JSYU.			425,720

*Approximately 55,675 acres of the 135,146 acres excluded from the timber production base due to problems have some management potential and are referred to as low intensity lands.

Figure 1-2 PORTION OF TPCC PHOTOMAP (HALF SCALE) T. 32 S., R. 4 W.

Operations Inventory (OI)

For BLM to carry out the timber management program effectively, specific information as to the location and current condition of the various forest types within the land base must be available to the managers. This is accomplished through the Operations Inventory (OI).

The OI is an intensive inventory providing forest type maps which show the location and identification number of each homogeneous coniferous type island. Corresponding cards list acreage, silvicultural needs and opportunities for forest management practices such as mortality-salvage or thinning. Operations Inventory thus provides a basis for establishing priorities for treatment based on stand conditions and productivity.

1976 Reinventory

A reinventory of commercial forest land in the JSYU was completed in 1976 employing procedures for extensive inventory jointly developed by the USFS and BLM (USFS, 1976). The reinventory uses the same basic inventory design as was used for determination of the present allowable cut, but with further refinement to include stratification of commercial forest land based on information obtained from the Operations Inventory and TPCC.

Commercial forest lands were placed in sixteen strata, each stratum being descriptive of a particular set of conditions and traits. Following the stratification process, the number of inventory plots required to obtain statistically sound estimates was determined for each stratum. The number of plots depended primarily on the amount of variability within strata. A stratum with much variance required more plots, and, conversely, the number of plots was fewer within strata that had little variance.

The reinventory is a stratified random sample utilizing 138 field plots established in the previous inventory within applicable strata and 100 additional field plots established to meet the sampling design requirements. This approach provides the benefits of remeasurement of existing plots as well as better strata estimates for the allowable cut computation.

Measurements taken at each plot point included the physical dimensions of the trees, merchantable volume, etc. The accuracy of the measurements recorded was frequently checked by the District Inventory Specialist, District Cruiser/Appraiser Specialists, and BLM's Oregon State Office Inventory Specialist, and accuracy was found to meet established standards.

1.4.1.2 Other Resource Inventories

Other inventories were conducted to identify and categorize specific resource capability and potential. A detailed soil survey for the entire Medford District was completed in December of 1975. Recreation planners

applied portions of the BLM's Recreation Information System, an inventory approach for determining inherent potential of the land to support various recreation activities. Visual resource specialists inventoried and classified the JSYU for visual and esthetic considerations. Wildlife biologists inventoried deer and elk winter range and spotted owl nest sites. Fisheries biologists conducted stream surveys of Class I and Class II streams.

1.4.2 Land Allocations for Other Resources

The final step in determination of lands included in the proposal involved application of the Bureau planning system. A description of this approach to multiple use allocation of land, together with a full discussion of its application to the JSYU, is contained in Section 1.8.1.

Some previous land use allocations were not subject to review in the planning system. Public lands within the designated boundary of the Rogue Wild and Scenic River, for instance, were withdrawn in 1969 through Congressional action. Table 1-4 summarizes land allocations to other resource considerations in the JSYU.

Table 1-5 displays the interaction of various steps in the evolution of the proposal. TPCC data identify the commercial forest land which may be included in the timber production base. Timber production potential is determined from reinventory and the TPCC classification. The proposal represents multiple use considerations which are beyond those incorporated in TPCC and which were identified and dealt with through the planning system.

Table 1-4

Land Allocations for Resources Other Than Timber

	Acres
Prior Land Use Allocations Continued	
Rogue River Corridor	11,087
Existing Recreation Areas	942
Subtotal	12,029
Proposed Allocations through Bureau Planning System	
Buffers, Class I Streams	1,600
Spotted Owl Reserves	440
Botanical Sightseeing Areas	250
Rogue River Foreground (outside corridor)	1,300
Subtotal	3,590
Total Current and Proposed Allocations	15,619

Table 1-5

Evolution of the Proposed Action

Management Class of Commercial Forest Land	Timber Production Potential			Multiple Use Considerations		Proposed Action	
	TPCC (acres)	Area (acres)	Potential Annual Harvest million cubic feet (million board feet)	Reduced Area	Reduced Annual Harvest million cubic feet (million board feet)	Area	Planned Annual Harvest million cubic feet (million board feet)
High Intensity Lands	229,310	226,486 3/	18.67 (95)	3,590 4/	0.33 4/ (1.7)	222,896	18.39 5/ (94)
Low Intensity Lands 1/	135,146	55,675	2.28 (12)	0	0 (0)	55,675	2.28 (12)
Limited Management Lands 2/		79,471	0	0	0 (0)	79,471	0
Total Commercial Forest Land	364,456	361,632 3/	20.95 (107)	3,590	0.33 (1.7)	361,632	20.67 5/ (106)

1/ Excluded from timber production base in TPCC; portion identified for trial harvest program through planning process.

2/ Excluded from timber production base in TPCC; no planned harvest proposed.

3/ 2,824 acres to non-forest category between time of TPCC and the reinventory.

4/ Numbers taken from Table 1-9 (B-effects of each issue).

5/ Numbers do not add up due to rounding.

1.5 ALLOWABLE CUT DETERMINATION

In accord with the objectives of the proposal and based on land use allocation arrived at through the Bureau planning system, the sustained yield allowable cut is determined. Allowable cut in the proposal is the annual harvest from high intensity lands. Volume attained through trial harvest on low intensity land, while planned and proposed for the first decade, is not predictable into the future and therefore not part of the proposal beyond the first decade.

1.5.1 The Present Forest

The reinventory completed in 1976 found the forest distribution as displayed in Table 1-6. Age classes range from non-stocked, where reproduction has not been established, to 350 years. The growth falloff in older classes should be noted.

The present forest is greatly out of balance compared to a managed forest. Whereas a managed forest would have approximately equal areas for each age class sought, the present forest is as shown in Figure 1-3.

1.5.2 Unit of Measure

Within a 20-year planning horizon the forest objective was set to maximize yield of timber suitable for the productlon of lumber and plywood.

Table 1-6

Age, Volume and Growth Distribution
High Intensity Lands

------------ YEAR 1976 ------------

AGE CLASS	ACRES	TOTAL VOL. M. CU. FT.	ANNUAL GROWTH CU. FT.	AGE CLASS	ACRES	TOTAL VOL M. CU. FT.	ANNUAL GROWTH CU. FT.
non-stocked	10,894	-	-	170	3,843	19,744	56,120
1-5	1,729	-	-	180	969	5,111	12,420
10	18,211	-	-	190	2,335	12,595	25,759
20	6,203	-	-	200	1,938	10,650	17,919
30	5,508	7,398	218,132	210	2,335	13,027	17,420
40	3,663	6,338	138,524	220	3,303	18,644	18,744
50	2,309	4,848	83,197	230	2,317	13,189	9,011
60	6,044	14,813	206,981	240	3,522	20,154	7,408
70	3,601	10,027	116,889	250	13,765	78,934	4,374
80	3,400	10,540	104,293	260	14,257	81,674	-20,928
90	10,001	33,982	288,916	270	8,924	50,912	-29,035
100	4,741	17,437	128,495	280	969	5,488	-4,883
110	7,295	28,742	184,690	290	321	1,799	-2,191
120	4,164	17,423	97,986	300	47,929	264,908	-412,699
130	2,731	12,045	59,388	310	2,317	12,586	-24,088
140	6,422	29,664	128,185	330	4,634	24,043	-64,726
150	8,351	40,167	151,776	350	4,892	23,840	-85,801
160	8,426	41,984	138,093				
				Total	232,263	932,705	1,570,369

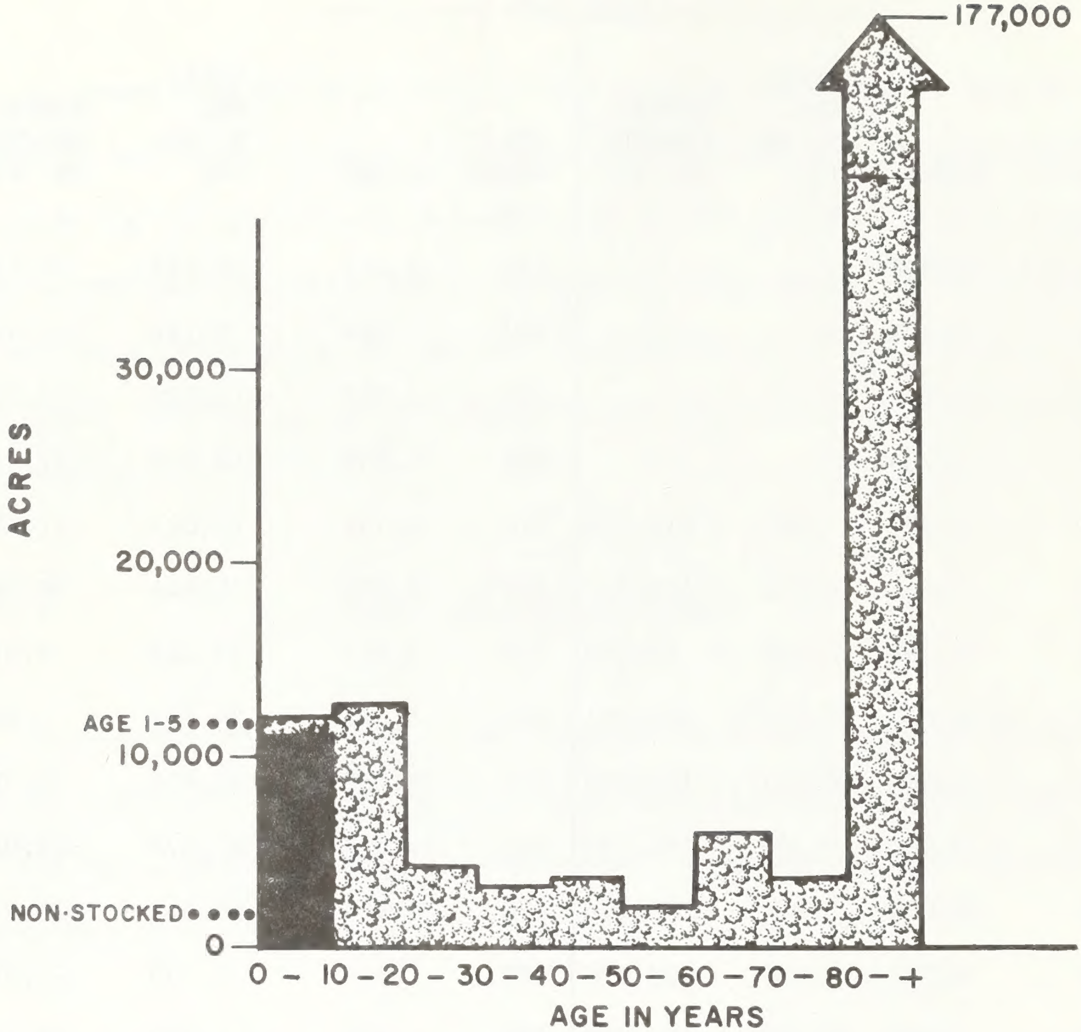


Figure 1-3 AGE CLASS DISTRIBUTION • HIGH INTENSITY LANDS
SOURCE: BLM Forest Inventory • 1976

Considering the objective, cubic feet appears to be the most meaningful and accurate unit. Thus, all allowable cut calculations for the SYU are carried out in cubic feet. For convenience, board foot Scribner equivalent is computed and frequently cited.

1.5.3 Management Assumptions

A wide range of possible management practices was considered. The practices used in the forest simulation model (described in Section 1.5.4) for high intensity lands are varied harvest, reforestation, and growth stimulation techniques.

Harvest technique assumptions relate to land suitability relationships discussed in Section 1.4.1.1, TPCC. Prescribed harvest methods are a combination of the clearcut and two-stage shelterwood systems, dependent on site suitability. Intensive planting is planned following the regeneration cut of a shelterwood regime or clearcutting. Minimum planned harvest age is 60 years. Approximately 4,000 acres will be converted to non-forest during the first decade as the remainder of the permanent road system is completed.

It is expected to require an average of four years to establish a new stand of coniferous seedlings following clearcut harvest or the regeneration cut of a two-stage shelterwood regime. This regeneration period is within Bureau limits for sustained yield management. Use of genetically superior planting stock is not considered feasible since sufficient supplies will not be available within the twenty-year planning horizon.

Use of herbicides for control of broad leaf competition to favor growth of commercial coniferous species is explicit in the proposal as part of timber stand reestablishment. Herbicides will be used for site preparation before planting on approximately 33,500 acres of high intensity lands during the first decade. Approximately 13,200 acres of established reproduction will be released from brush or grass competition by herbicide treatment during the same period.

Three intensive management practices are considered suitable following harvest and regeneration. Intensive management practices enhance growth and productivity once a stand of commercial coniferous species is established. Precommercial thinning, commercial thinning, and fertilization are economically justified and result in net volume increases.

Thinning at a twenty-year interval is assumed, with precommercial thinning no earlier than age thirteen. Fertilization is planned and assumed in the simulation model immediately after pre-commercial thinning and every ten years thereafter. Commercial thinning will be employed when stands reach commercial size -- no sooner than age class 30.

Each addition of an assumed practice has a cumulative effect on the sustainable annual harvest. This effect is displayed in Table 1-7. The end result is the production level contained in the proposal for high intensity lands -- 18.39 million cubic feet per year.

Table 1-7

Effect of Assumed Practices on Annual Harvest Volume, High Intensity Lands

Assumed Practice	Sustainable Annual Harvest million cubic feet (million board feet)
Harvest and plant	12.58 (64)
Above, with herbicides for site preparation and plantation release	15.09 (77)
All of the above, with thinning	16.98 (87)
All of the above, with fertilization	18.39 (94)

1.5.4 Mechanics of Computation

1.5.4.1 High Intensity Lands

The annual proposed allowable cut of 18.39 million cubic feet for the 222,896 acres of high intensity lands was calculated with a computerized forest simulation model. This model projects the present forest, as described in Section 1.5.1, 400 years into the future. Based on the management assumptions as described in Section 1.5.3, it determines the largest allowable cut sustainable over the projection period. Age class distribution of forest stands, annual wood growth, wood volume, and acreage of certain treatments are also determined for each of the 40 decades.

A 400-year projection is necessary to insure that the allowable cut is at the highest level that can be sustained, ad infinitum, consistent with the BLM's policy for a constant or increasing flow of wood over time without any planned reduction. The projection is not to be construed as a 400-year timber management plan.

The most critical elements that influence the magnitude of the allowable cut are total wood volume and annual wood growth, present and future. As shown in Figure 1-4, the proposed allowable cut is approximately eight times the present current annual growth. This difference is primarily due to the preponderance of overmature stands in the JSYU, which are growing at low rates or not at all, as a result of high natural tree mortality.

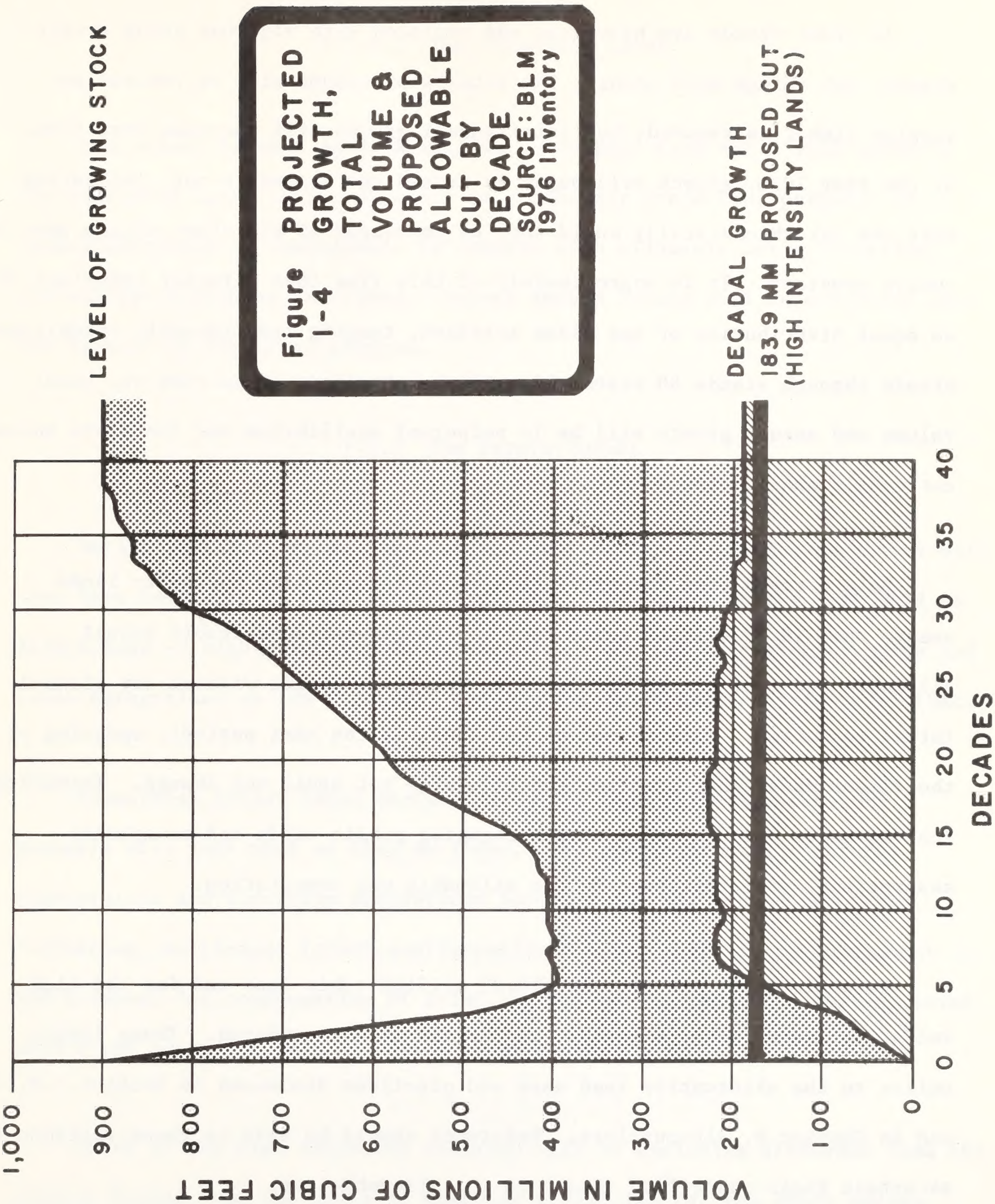


Figure 1-4 PROJECTED GROWTH, TOTAL VOLUME & PROPOSED ALLOWABLE CUT BY DECADE
SOURCE: BLM 1976 Inventory

As older stands are harvested and replaced with vigorous young growth stands, two things will occur. The total wood volume will be reduced as surplus timber is removed, but total annual growth will increase over time. By the year 2036, growth will begin to exceed the allowable cut, indicating that the cut theoretically could then be increased if all other things were to remain constant. It is approximately at this time that a forest comprised of an equal distribution of age class acreages, ranging from recently established stands through stands 80 years old, will be attained. From then on, total volume and annual growth will be in perpetual equilibrium and therefore annual cut equals annual growth.

Data derived from the simulation model for the high intensity lands assure that 18.39 million cubic feet is the highest sustainable annual allowable cut that can be harvested in the first decade without any planned future reduction. This is not to say that, in the next periodic updating of the timber management program, the allowable cut could not change. Technological advances, in conjunction with changing public needs and management assumptions, will influence future allowable cut computation.

In arriving at the proposed 18.39 million cubic feet cut for the high intensity lands, other allowable cut levels were considered. These levels relate to the alternative land uses and practices discussed in Section 1.8.1.2 and in Chapter 8, Alternatives. Reference should be made to these sections to ascertain their quantified impact on the allowable cut.

1.5.4.2 Low Intensity Lands

The annual harvest of 2.28 million cubic feet from the 55,675 acres of low intensity lands is based solely on a ten-year projection period. It cannot be viewed as sustainable in context with allowable cut calculation procedures previously described. Future decade levels will be dependent upon the results of the trial program.

1.5.5 The Future Forest

During the fifth decade harvest and utilization of old growth timber will have been completed on high intensity lands. The forest of the JSYU will be dichotomous -- high intensity lands exhibiting one set of characteristics and lands categorized as low intensity and limited management exhibiting another.

Commercial forest lands excluded from the high intensity category probably will look much as they do today. The prescription for natural regeneration and two-stage shelterwood harvest will perpetuate the mixed coniferous, multi-aged forest configuration. Since there is no commitment in the proposal for continuation of trial harvest beyond the first decade, total effect and extent of harvest cannot be predicted.

Areas in the high intensity category will be radically different from the present forest. On the basis of computer projection for the sixth decade, timber stands more than 80 years old will be rare. A typical 70-year old stand might exhibit the following characteristics:

Volume per acre	6,000-7,000 cu. ft. (30-35 M bd ft Scribner)
Average diameter (Dbh)	15-20 inches
Trees per acre	200-225

Stocking will be controlled by thinning throughout the life of the stands. Competition from grass, brush, and non-commercial tree species will be controlled until commercial species attain dominance, usually within 20 years. The road system will be complete and will provide ready access to all stands.

Because of the smaller tree sizes and the correspondingly smaller machinery needed to handle them, falling and yarding will have less impact on the site. In addition, better utilization and the small amount of cull material expected will mean that slash disposal problems, as we now know them, will not exist.

Man and his machines will be present within the stands much more frequently than at present. The planting and nurturing of seedlings will be followed, where needed, by pre-commercial thinning in age class ten. Fertilization will follow on a ten-year cycle. Commercial thinnings will begin at about 30 years of age and will be repeated on a 20-year cycle.

1.6 PROJECT DESIGNS INCLUDED IN THE PROPOSAL

Table 1-1 displays the ten-year plan of prescribed management treatments in the typical sequence, beginning with road construction or improvement.

Following harvest, either by shelterwood or clearcut, the sequence of treatments reflects those actions necessary to facilitate prompt reforestation of the specific tract, and then subsequently to growth of commercial coniferous species. The discussion in this section will be in the same order as listed in Table 1-1.

Treatments are identified and scheduled through application of the Operations Inventory system. Determination of treatment needs for those actions to be required in the sales contract is accomplished during timber sale planning.

Not every treatment listed in Table 1-1 will be applied to every acre. An infinite number of treatment combinations is possible and may be employed. The purpose of this section is to amplify on what each treatment entails and quantify, to the extent possible in a regional environmental statement, the magnitude of the actions.

Contracts, usually awarded on a competitive basis, are the vehicle for accomplishment of all timber harvest and many forest development practices. The standard and special provisions in a contract set forth the standards and specifications to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations, and policies.

In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken. Stipulations define the methods for

accomplishing the action and the manner in which it shall be accomplished. Appendix B is Bureau form 5450-3, the basic timber sale contract, and the printed provisions are applicable in all cases. Bureau Manuals and manual supplements provide a variety of approved stipulations for use, as appropriate, in individual contracts. The combination of selected special provisions constitute Section 41 of Form 5450-3.

Tables 2-57 and 2-58 show the level and types of treatments which have been applied in the JSYU under the present harvest plan.

Land use allocations and constraints on lands allocated to timber production, such as those discussed in Sectlon 1.8.1.2, are implemented through project design. A principal means for determination of applicable stipulations during preparation of a contract for a forest practice is the environmental assessment. Refer to Section 1.8.4 for a discussion of specific action environmental assessment.

In accord with BLM policy (Manual Section 6840), no actions will be taken which would jeopardize the continued existence of any federally listed threatened or endangered species. Also, BLM will comply with Oregon laws pertaining to state-listed species. Thus, where data are sufficient regarding these species, no jeopardizing action will be taken. Where data are insufficient, a survey of expected habitat will be done in conjunction with site specific action planning. If it is determined from this survey the proposed action would jeopardize this habitat, the action will be altered or abandoned as necessary.

1.6.1 Transportation System

On the average, 50 miles of new permanent road will be constructed annually during the ten-year period. Standards, i.e., width of running surface, ditches, fills and type of surfacing if any, remain to be determined.

Since portions of the existing road system are underdesigned, obsolete or unsafe, approximately 100 miles of road will be reconstructed during the proposal period. Approximately 50 miles of existing road will be surfaced. Types of surfacing is unknown.

1.6.1.1 Scope of Treatment

Based on average construction experience in the JSYU, one perennial stream and four intermittent stream crossings are involved in each mile of road construction or reconstruction. The breakdown, by stream classes defined in Section 2.1.2.2, Fishes, and as used in Table 1-9, Issue I, is as follows.

Stream Class	Interval
Class I	1 per 20 miles of road
Specific Class II	1 per mile of road
Other Class II	3 per mile of road

By the end of the proposal period the permanent road system will be essentially completed. Reconstruction of portions of the system may be required based on use and other factors. Resurfacing will take place as necessary.

1.6.1.2 Project Design Features

An Oregon Manual Supplement, Release 5-115 of April 10, 1975, is used in preparing road construction requirements for timber sale contracts. All engineering terminology and types of construction equipment are defined. Specifications for all aspects of construction, reconstruction and surfacing are provided.

Methods of slope protection are provided for use in avoiding collapse of cut and fill embankments. Specifications for rock pits and quarries include provisions for minimum visual intrusion, drainage and control of runoff and restoration following use.

One section provides design features to control and minimize erosion during road construction and throughout the design life of the road. Another section addresses soil stabilization practices including planting, seeding, mulching and fertilization for establishment of soil binding vegetation.

1.6.2 Timber Harvest

Two-stage shelterwood harvest technique will be employed on both high intensity and low intensity lands. Clearcutting will be employed only on high intensity lands and then only on areas determined by the Operations Inventory to be suitable.

1.6.2.1 Scope of Treatment

The regeneration cut of a shelterwood harvest will remove up to 60 per cent of the original stand. Maximum removal on south or west slopes will be 50 per cent. An average of 3,600 acres of high intensity land will undergo a regeneration cut each year. For low intensity lands, the trial harvest will average 500 acres per year.

Approximately 2,250 acres undergoing regeneration cut each year will be new areas previously undisturbed by man. The balance of regeneration cutting is in areas having experienced some disruptive activity such as initial entry under the three-stage shelterwood system presently employed.

Previous observations of areas following initial entry under a three-stage shelterwood approach show that most mortality is attributable to damage suffered during logging. With two-stage shelterwood it is expected that damage will be lessened since the heavier regeneration cut allows more room in which to fell timber and operate equipment.

Natural mortality occurs in all timber stands. Shelterwood systems allow the removal of trees judged to be most susceptible to insects, disease or windthrow during the regeneration cut. Under the proposal it is estimated that one tree per acre per year will die between the regeneration cut and the final harvest cut. No special salvage program is planned for high intensity lands since final harvest will take place as soon as the new stand is established. Average volume loss is estimated to be ten board feet per acre per

year due to deterioration of mortality timber prior to its salvage during final harvest cut.

Final harvest cut will take place after establishment of a new stand containing at least 300 commercial coniferous trees per acre. For high intensity lands, reforestation will be by planting following the regeneration cut. Reforestation of low intensity lands is dependent on natural regeneration.

No final harvest cutting is anticipated on low intensity lands during the proposal period. For high intensity lands there will be 9,000 acres of final harvest cut, predominantly in the second half of the decade.

Clearcutting of high intensity lands will average 500 acres per year during the proposal period. Approximately half, or 250 acres per year, will be new areas previously undisturbed by man.

1.6.2.2 Project Design Features

Harvest planning will assure sale area design meets the visual resource management class objectives for the vicinity. If proposed sale areas have been inadequately surveyed for cultural resources, a Class III inventory will be implemented in accordance with Bureau standards.

Oregon Manual Supplement 5424, Appendix 4a, lists special provisions or stipulations for use in the logging requirements portion of a timber sale

contract. It is estimated that 77 per cent of the proposed harvest in the JSYU will be accomplished by cable systems with tractors systems employed for the remainder. Choice of logging system is a design feature primarily to reduce soil damage. Refer to the BLM Timber Management Final Environmental Statement (FES 76-49) for a detailed description of logging systems.

Logging provisions available for use in Section 41 of the timber sale contract provide for a wide variety of situations which may be encountered on a particular sale area. Advance notice to the BLM prior to beginning or cessation of operations is normally required. Timing of completion in a cutting area, height of stumps, maximum length of logs for yarding, and type of equipment to be used may be stipulated to reduce damage to the site and the remaining trees.

A group of special provisions is available to protect specific values. These may prohibit yarding through streams or specific areas. Locations for landings may be limited. Time of year or operating conditions, e.g. dry soil, may be specified.

1.6.3 Slash Disposal

Provision for disposal of slash -- unutilized logging residue -- is contained in most timber sale contracts. Determination of specific requirements and extent of treatments to be employed is a function of planning for each specific sale.

1.6.3.1 Scope of Treatment

Burning

Acreages listed in Table 1-1 for burning are net figures, representing the estimate of total burned area. In actuality, portions of all 50,000 acres on which harvest will take place during the proposal period may be burned.

Disposal by burning will take place on 1,000 acres of high intensity lands per year and only ten acres of low intensity lands. There is a direct correlation between these figures and the prescription for reforestation in each class. Low intensity lands will be allowed to reforest naturally so disposal of all slash is not a large issue. Burning will be confined to those areas where slash concentrations constitute a fire hazard.

Slash disposal on high intensity lands will need to be directed beyond the requirement of fire hazard reduction. Emphasis will have to be placed on making such lands accessible to planting crews. Similarly, removal or concentration of large slash is implicit in the prescription. Otherwise, such material could be moved around by logging equipment during shelterwood final harvest and accidentally damage new plantations (see Gross Yarding).

Gross Yarding

Gross yarding may include several actions depending on the particular circumstances of the timber sale. Essentially gross yarding requires

removal of all material of a specified size; the proposed minimum is eight inches in diameter and eight feet long. Concentration points for such material are designated on landings, skid roads or other appropriate places. Material thus piled may be burned (included in estimate of acres for burning), resold after contract termination if market conditions are favorable or utlized by firewood cutters. The treatment is effective for both shelterwood and clearcut harvest techniques and applicable to both cable and tractor logging methods.

Machine Piling

Machine piling is employed on terrain suitable for tractor operations to bunch slash preparatory to burning. Generally a brush blade is installed on the tractor in lieu of the standard bulldozer blade. These blades are fitted with teeth which minimize soil displacement and reduce amounts of soil in piles.

In areas of identified soil compaction on landings and major skid roads, soil ripping to a depth of fifteen to twenty inches may be required.

In sale areas containing intermingled areas of brush within the cutting area, mechanical scarification of such areas may be required. The discussion of mechanical scarification in Section 1.6.4.1 is pertinent.

An average of 3,000 and 350 acres per year, respectively, of high and low intensity lands will be treated by gross yarding including machine piling. These figures aggregate all the activities described above.

1.6.3.2 Project Design Features

Section 15 of Form 5450-3 is the standard provision for fire protection and slash disposal. Numerous special provisions are available for use in a contract. Included are provisions for hand or machine piling, gross yarding to specific diameters and lengths, special piling and burning along roads and disposal of slash in accordance with written instructions from BLM.

The written instructions (or slash plan) is prepared jointly by BLM and the Oregon State Division of Forestry (OSDF). Reference in Section 25 of the contract to the purchaser complying with applicable Federal and State laws includes obtaining a burning permit from OSDF prior to undertaking slash disposal. Burning is conducted in accordance with the Oregon Smoke Management Plan (see Section 1.8.3.2).

Through a recent agreement with the State Forester it is now possible for slash disposal on public lands to be supervised and performed by OSDF personnel.

1.6.4 Site Preparation

Site preparation improves the potential for plantation success by reducing competition for light, moisture, and soil nutrients prior to or at

the time of reforestation. Site preparation makes it easier to plant an area where the timber has been harvested and gives tree seedlings a much improved chance for survival and rapid growth in the absence or near absence of competitors. Brush fields and poorly stocked plantations resulting from plantation failures require brush and hardwood control to bring these lands into full timber production.

1.6.4.1 Scope of Treatment

Herbicides

Herbicides are used principally to control grass, forbs, brush and non-commercial tree species.

Herbicides are applied aerially or by several ground methods. The method selected is dependent on costs, topography, limits of the equipment, kind and dispersion of target plants, potential environmental impacts and biological conditions.

Most of the herbicides proposed for use in the JSYU are to be applied by helicopters equipped with positive shut-off spray systems to limit herbicides to the target areas. Helicopter application is accomplished under contract through a competitive bidding processes.

Combinations of herbicide are used as recommended by knowlegeable scientists. Combinations permit a broader range of effectiveness when there is a range of target species beyond the capability of a single chemical.

Water is usually the carrier for growing season application of herbicides. Most formulas for the growing season applications also use a small amount of diesel oil to dilute the herbicide. The resulting solution is emulsified in water for spraying. Growing season applications entail 0.5 to 1.0 gallons of diesel oil per acre and constitute approximately one third of all herbicide usage.

For dormant season applications, diesel oil constitutes most of the spray solution, averaging fifteen gallons of diesel oil per acre. Approximately two-thirds of all herbicide spraying is dormant season application according to recent western Oregon experience.

Herbicides, as single chemicals or in combination, will be used for high intensity lands site preparation at a rate averaging 3,350 acres per year. An estimated 1,000 acres of low intensity lands will be treated during the proposed trial period. Table 1-8 shows the chemicals, target species, and estimated acreage of herbicide use in the JSYU during the proposal period. Acreage by chemical combination remains to be determined. Following are brief descriptions of the chemicals to be employed.

Table 1-8

Estimated Ten-year Utilization of Herbicides

Chemical	Site Preparation Estimated Acreage*	Stand Release Estimated Acreage*	Target Species
Silvex	20,000	9,000	Tan Oak Canyon Live Oak Chinquapin Rhododendrun
2,4,D	20,000	9,000	Madrone Hazel Ocean Spray Blackberry Ceanothus spp.
Round Up	5,000	1,000	Blackberry Alder Swordfern Brackenfern Vine Maple
Krenite	5,000	1,000	Alder Blackberry Vine Maple Wild Rose Thimbleberry Brackenfern
Atrazine	15,000	1,000	Grass
Dalapon	5,000	1,000	Annual Grasses Forb

* Chemicals are often used in combination, therefore totals shown here will not equate with treatment acreages of Table 1-1.

Silvex

Silvex (trade names--2,4,5-TP, Kuron, Weedone) is a selective herbicide used for site preparation, release, thinning conifers, and controlling poison oak in administrative sites by ground application. It is a phenoxy herblcide similar to 2,4,5-T or 2,4-D. However, it is potentially more damaging than 2,4,5-T to conifers when used as a release spray. It is normally applied at a rate of two to three pounds per acre.

2,4-D

2,4,-D is a selective phenoxy herbicide used for site preparation, conifer release, thinning conifer plantations, control of noxious and poisonous plants, and maintenance of improvements. If properly used it will not damage conifers when applied aerially as a release spray. It is usually applied at a rate of two pounds per acre.

Roundup

Roundup appears to be an excellent replacement for Silvex in deciduous Coast Range brush and to be particularly effective in multi-story alder-salmonberry stands. The chemical does not control evergreen brush and is not particularly useful on sclerophyll vegetation. Roundup may prove useful against herbaceous vegetation, as well as against certain deciduous species of brush. Roundup costs about three times as much as Silvex. It appears to be more effective on target species.

Krenite

Krenite is a new herbicide registered in the State of Oregon for site preparation and release on forest lands. It is applied at a rate of three to five pounds per acre to control deciduous woody plants and certain noxious or poisonous weeds and to maintain improvements. It can be used for "trimming" by treating only those parts of the plant needing control. For instance, branches overhanging a right-of-way clearing can be sprayed without killing the entire tree. Other herbicides or treatment methods must still be used for site preparation in brush communities where evergreen shrubs require control because Krenite is not effective against evergreens.

Atrazine

Atrazine (trade names-Aatrex 80w, Aatrex 4L, Atrazine 80w) is a selective herbicide used to release conifers from grass competition and to prepare grassy sites prior to planting. Application rates are usually four pounds of active ingredient per acre.

Dalapon

Dalapon (trade name--Dowpon M) is a selective herbicide used at rates of four to six pounds per acre to control certain grasses in site preparation and maintenance of improvements.

Mechanical Scarification

Mechanical scarification is piling and/or windrowing brush and is normally accomplished with brush blade equipped bulldozers. To be acceptable, these operations must be restricted to: (1) slopes generally less than 40 per cent due to equipment limitations and serious erosion hazards attendant to bare, exposed soils; (2) dry soil conditions; and (3) suitable soils.

Approximately 160 acres of mechanical scarification are planned during the proposal period in addition to that scarification which may be accomplished through timber sale contract requirements.

1.6.4.2 Project Design Features

General

Only Federally registered pesticides may be used on public lands except as authorized by Sec. 24c, Public Law 92-516, The Federal Environmental Pesticide Control Act of 1972. Section 24c provides for State registration of certain pesticides for local needs within the State. Any pesticide proposal planned under a State registration must include a copy of the State label.

Specific projects for herbicide use in the JSYU are developed in the Medford District Office. All projects are reviewed at BLM's Oregon State Office and then at the Denver Service Center of BLM (DSC). Many projects are

approved at the DSC level. However, some which involve unusual situations or chemicals may be referred to the BLM Washington Office, Division of Watershed Management for review. Those not receiving approval at this level may be referred to the Department of the Interior for final resolution.

Specific

Proposed decisions of the Josephine Management Framework Plan (see Section 1.8.1.2) are very specific with regard to site preparation. They include prohibition of aerial spraying within 100 feet of perennial streams and prohibit treatment of an entire drainage within a short period of years. Limitations are placed on mechanical scarification based on soil, topography, and proximity to streams.

Timing of herbicide treatment is stringently controlled. Weather conditions, humidity and wind, are tightly specified. There is full authority for ordering cessation of operations based on adverse field conditions. Both equipment employed and equipment operators are frequently checked by field project supervisors.

Specific design features included in herbicide projects plans and contracts for application include the following considerations.

If endangered or threatened plant species are known or suspected to occur within the influence zone of the proposed action, an on-the-ground floristic

inventory is made. The project will be modified to protect such plants if they are threatened by the proposed action.

On herbicide application projects conducted directly by Bureau personnel, a licensed employee will monitor and supervise the project. Work done by contractors will be carried out by individuals having proper State licenses.

Contractors may not wash out any spray tanks in or near any of the streams or dispose of any chemical containers on the contract area.

During aerial spraying, spray will be turned off at the end of spray runs and during the time when a turn is being made.

Mixing and loading operations will take place in an area where an accidental spill will not flow into a stream or body of water.

Except for herbicides registered for use in and adjacent to water, the following are minimum widths for unsprayed buffer strips (measured horizontally) adjacent to Class I Streams, bodies of water, or marshy areas:

a)	Aerial Spraying	
	Spraying Altitude (over ground)	Buffer Strip
	30-45 feet	100 feet
b)	Vehicle spraying	25 feet
c)	Hand application	10 feet

To minimize drift and volatilization, aerial spraying will utilize low volatile ester formulations and be confined to periods when wind speed is less than six miles per hour, air temperature is under 70 degrees, relative humidity is over 50 per cent, vegetation is free of snow or ice, precipitation is not occurring or imminent, and air turbulence will not affect normal spray patterns. Label directions will be followed if additional restrictions are required.

Frequent measurements of weather conditions will be made by trained personnel at spray sites during application. Additional measurements will be made anytime it appears that a weather change may be taking place that could jeopardize safe placement of the spray on the target area.

Helicopters will normally be required to fly at an airspeed of 40 to 50 m.p.h. at 30 to 45 feet above the vegetation. Spray pressure in the boom will be 25 to 35 pounds per square inch. Minimum drift reduction with normal spray formulations and conventional application equipment will be obtained by using D8 jet nozzles (8/64 inch diameter orifice) directed back along the airstream (Stewart, 1976). All aerial nozzles will be equipped with automatic shutoff devices to prevent loss of herbicide along nonspray flight routes.

A water monitoring program is carried out by the Bureau as part of the spray project. The purpose is to determine the effectiveness of buffer strips, and administrative controls in protecting water quality and the

aquatic environment. Water monitoring will be done when any herbicide application is in a municipal watershed, in a fish hatchery supply watershed, in a watershed with a domestic water supply intake for drinking or irrigation less than one mile downstream from the treatment area or where a herbicide application is adjacent to or the treatment area includes a major fish bearing stream.

Water monitoring of streams begins prior to herbicide application to identify the normal level of water quality. Stream samples are systematically taken for intervals up to ten days following spraying.

1.6.5 Planting

1.6.5.1 Scope of Treatment

To achieve adequate reforestation within the prescribed five years following harvest, harvested areas will be planted with nursery grown commercial coniferous species within one year. Planting stock is grown from seed collected on sites and at elevations similar to the specific project area.

Douglas-fir is the predominant species planted in the northern half of the JSYU and also at elevations above 2,700 feet in the southern half of the unit. Below 2,700 feet in the southern half, the anticipated species mix for planting is Doulgas-fir, 70 per cent; ponderosa pine, 20 per cent; and sugar pine, 10 per cent.

The proposal calls for planting all the high intensity lands undergoing shelterwood regeneration cut and clearcut. The total planting area averages 4,100 acres per year.

During the first five years of the proposal, about half of the seedlings used will be two-year-old stock (2-0 bareroot). The other half will be one-year-old seedlings grown in containers to minimize root disturbance and transplant shock when planted. In the latter half of the proposal period, the ratio is expected to shift toward a 60/40 distribution between bareroot and containerized planting stock.

More than 9,000 acres of high intensity lands are presently nonstocked or understocked (minimum acceptable stocking is 300 seedlings per acre). Adequate reforestation of backlog acreage is an important aspect of the proposal. Project areas in this category will generally require site preparation prior to planting. Containerized stock is expected to be used more often for reforestation of backlog acreage.

Reforestation experience in the JSYU shows that adequate stocking of 300 trees per acre cannot always be achieved by the initial planting. An estimated 12,300 acres will require replanting or interplanting during the proposal period.

Loss of seedlings during shelterwood final harvest cut is expected to be moderate. Final harvest will not take place until adequate stocking is

achieved. Normally, the underplanted population will exceed 300 trees per acre. Nevertheless, interplanting following final harvest has been considered in generating the 12,300-acre figure for replanting.

1.6.5.2 Project Design Features

Primary project design features associated with planting address care of stock prior to planting and methods of tree placement. Each planting area is sampled for adequacy of spacing. Contract penalty clauses are directly tied to quality of planting.

Post-treatment surveys are conducted to determine rate of survival. If inadequate, replanting or interplanting may be undertaken.

1.6.6 Herbicide Release

Release is the reduction of competition for light, moisture, and nutrients between shrubs or grass and existing commercial coniferous seedlings. Fast growing trees, such as red alder or vine maple, overtop and suppress slow-starting conifer seedlings. The degree and type of competition varies with the individual site. On dry sites, grass competes effectively for water, while elsewhere hardwoods grow rapidly enough to shut out essential light and compete for water during the dry summer. In recent years, herbicides have been used effectively to inhibit the growth of competing vegetation, thus increasing available water, nutrients, and light for suppressed conifers.

1.6.6.1 Scope of Treatment

With reduced competition, the conifers will rapidly grow beyond the point where they can be overtopped and further suppressed by surrounding vegetation. An average of 1,320 acres per year of high intensity lands is planned for herbicide release spraying. (Table 1-8 lists the chemicals to be employed). Discussion of specific herbicides in Section 1.6.4 is also applicable to release spraying.

1.6.6.2 Project Design Features

Project design features are the same as for site preparation using herbicides.

1.6.7 Precommercial Thinning

Precommercial thinning is applied to stands approximately fifteen years of age which have too many trees (commercial forest species). Trees will be 10 to 30 feet in height at that age. This treatment is used to concentrate available nutrients, moisture and light into those trees which will be the eventual crop for the next harvest.

1.6.7.1 Scope of Treatment

The number of well-spaced trees per acres after precommercial thinning is dependent on the biological productivity of the area and tempered by future

plans to conduct commercial thinning later. While average spacing is approximately twelve feet by twelve feet, the number of crop trees left may vary between 245 and 320 per acre. Least productive sites will be thinned more heavily. Precommercial thinning is planned on an average of 1,420 acres per year.

1.6.7.2 Project Design Features

Contract specifications or field instructions to BLM crews cover desired spacing of crop trees and criteria of crop tree selection. Seldom are crop trees individually marked although this may be the approach when dealing with a new contractor or crew.

1.6.8 Fertilization

Fertilization is planned for areas that undergo thinning. Detailed on-site soil analysis will be employed to determine composition of fertilizer needed, rate of application, and timing between applications. Average application is expected to be 200 pounds of active nitrogen per acre at ten-year intervals.

In addition to acceleration of growth for up to seven years following fertilization, the treatment tends to reduce shock associated with thinning. Approximately 18,900 acres will be fertilized during the proposal period.

Fertilizer will not be applied within 100 feet of a perennial stream. Water quality monitoring similar to that for herbicide use is undertaken.

1.6.9 Commercial Thinning

Stands ranging in age from 30 to 70 years will be commercially thinned, under terms of timber sale contracts, at 20-year intervals to maximize the production of forest products. At the first thinning the crop trees will be nine to eleven inches in diameter. In the process, suppressed, intermediate and some codominant trees will be sold and removed. Timing of thinning will be dictated by degree of crown closure and growth rate, with reduced growth rate being a primary indicator. Following one or more commercial thinnings, the final crop at age 80 will consist of 200 to 225 trees per acre.

Nearly 5,000 acres are scheduled for commercial thinning in the ten-year plan. See Section 1.6.2. for a discussion of design features of a timber sale contract.

1.7 MONITORING AND RESEARCH

As used in this section, monitoring refers to evaluation of cause-effect relationships which result from land manipulation projects inherent in the proposal. It presupposes that monitoring takes place both before and after the treatment.

Research, on the other hand, is broader in scope. It seeks the facts upon which cause-effect relationships rest and ways to remove undesirable aspects of the relationship. Most timber-related research with which BLM is involved searches for ways to improve wood fiber production. It is a function of USFS research facilities to identify and investigate forest management technology.

The ongoing tree improvement program is directly related to research, but goes much further since Bureau personnel and facilities are actively involved. Ultimately, the managed forest will be made up of genetically superior trees. This eventuality is not foreseen within the 20-year planning horizon, but research and testing to that end is a major emphasis. Benefits of research are translated into operational programs.

1.7.1 Monitoring

The Bureau of Land Management monitors land management practices primarily through administration of the contracts under which most actions are authorized. Evaluations of operations at each organizational level are conducted periodically to assure that all aspects of policy and procedure are adhered to and an acceptable level of compliance is attained.

Timber harvest planning in and of itself is monitoring due to the regular, recurring cycle on which it takes place. Each successive recomputation of allowable harvest is based on newly acquired inventory data. Often,

due to technological advances in the science of forest measurement, the procedure varies from one computation to the next. Nevertheless, baseline is established by the previous computation and the new data are comparable.

Monitoring of environmental components is proliferated amongst numerous Federal, State, and local agencies. For instance, water quality within or adjacent to the JSYU is monitored by the U.S. Geological Survey, Oregon Department of Environmental Quality, Corps of Engineers, and the Environmental Protection Agency. In the EPA program, BLM is a cooperator, with Bureau personnel gathering some of the samples.

Water resources data from reporting stations in the JSYU are displayed in Section 2.1.1.4. Two additional stations (Williams Creek and Galice Creek) have been proposed by BLM to facilitate assessment of the success of Bureau timber management practices. These stations have not been authorized as yet.

Air quality is monitored, primarily in urban areas, by DEQ. In the JSYU, the only air quality monitoring station is in Grants Pass. Slash burning is conducted only when smoke dispersal conditions, as determined by the Oregon State Department of Forestry, are adequate to meet criteria of their Smoke Management Plan.

Site specific inventories are a type of monitoring. Intensive soil surveys, specific area terrestrial and aquatic wildlife inventories, cultural

resources survey, and endangered species survey are in this category. Surveys of this nature may be conducted as a preparatory step in the planning of a particular timber sale or forest development project.

1.7.2 Research

BLM is not a direct research agency and does not employ scientists whose primary duties are to conduct research. Research needs are identified by managers and resource specialists who recognize problems relating to resource management. Proposals for research are prepared and the work is contracted to agencies, institutions or companies equipped and prepared to do the problem resolution. Often a research organization is interested in the same or similar problem and the investigation is jointly funded.

BLM's cooperative research program is evaluated periodically with new projects added or thrust changed in on-going investigations as may be necessary in light of the latest management requirements. Several current research projects are expected to result in findings which will benefit management in the JSYU. Research in the following categories is now underway.

Project	Expected Completion Date	Research Organization
Log Grade and End Product Research	Indefinite	Pacific Northwest Forest and Range Experiment Station
Effects of Soil Compaction on Growth	1979	Oregon State University
Development of Rust Resistant Pines	Indefinite	Forest Service-Region 6
Forest Fertilization	1983	University of Washington
Pollen Storage Study	1979	Oregon State University
Hybridization of Genus Pseudotsuga	Indefinite	Oregon State University
Reforestation in S.W. Oregon	1981	Pacific Northwest Forest and Range Experiment Station
Determination of Physiological Quality of Planting Stock	1979	Oregon State University
Evaluation of Survival Potential of Douglas-fir Under Drought Stress	1988	Oregon State University
Development of Guidelines for Improved Nursery Stock	1980	Pacific Northwest Forest & Range Experiment Station

1.7.3 Tree Improvement

Inspection of the foregoing list shows several research projects which deal with genetics and, as such, imply tree improvement. Research, monitoring and field testing in forest genetics has been in progress for decades. Specific BLM participation began in 1958 when it became obvious that white

pine blister rust control by conventional methods, i.e. removal of Ribes sp, the alternate host, was no longer economically viable.

Sugar Pine trees in southwest Oregon which exhibit natural resistance to blister rust were sought out. Seed was gathered from potential candidate trees and their seedlings were artifically tested for resistance. Candidates showing promise for genetic transfer of a resistant characteristic were cloned at BLM's Charles A. Sprague Seed Orchard near Merlin and hybridized in various combinations.

Numerous field outplantings were established, primarily through seed spotting. An operational application in the JSYU involved approximately 40 acres, which were planted with seed from rust-resistant sugar pine in 1977. Natural resistance testing continues.

The Sprague Seed Orchard is primarily involved with the sugar pine program, with additional work in ponderosa pine. Due to sugar pine's ability to grow on dry sites, future genetic work with the species may include research directed toward increasing growth in addition to retaining the rust-resistant characteristic.

Douglas-fir improvement programs have sought, through field evaluation of open pollinated and cross pollinated progeny, to identify superior trees that transmit the desired characteristics. Cuttings from superior trees are grafted to established root stock in the seed orchard. Through this process, cone production can be achieved as early as ten years from grafting.

Grafted trees from the JSYU are now at BLM's Walter Horning Seed Orchard near Salem. The trees are waist high but still five to ten years from cone production. Sprague Seed Orchard is not well suited for Douglas-fir, but a new seed orchard within or closely adjacent to the JSYU is planned.

The tree improvement program is now receiving additional emphasis. Naturally pollinated cones from identified superior trees are being collected. Seedlings grown from this seed will be planted and evaluated on representative soils and sites to determine which trees exhibit superior characteristics. Progeny from superior individuals will be placed in seed orchards for seed production and further breeding.

The listed research in Douglas-fir drought stress is especially applicable to the JSYU, and particularly low intensity lands. It is a joint venture of BLM, OSU and the USFS aimed primarily at determining plantation zones and tree breeding populations for southwest Oregon. In this effort Douglas-firs from harsh sites are studied to determine genetic characteristics which allow them to survive and grow under such conditions.

Seed was gathered from approximately 250 trees in 1976. In 1979, when the seedlings are two years old, they will be planted in 120 field test plots of up to two acres each. Planting sites will be carefully selected to measure the full range of variables which allowed the parents to become established in their severe sites. It has been said that this will be one of the largest, most complex outplantings in the history of forest genetics in Oregon.

Simultaneously, laboratory tests are being conducted with seedlings from a portion of the same seed. Under controlled conditions the ability of these plants to take moisture from the soil is compared to other Douglas-fir.

1.8 INTERRELATIONSHIPS WITH OTHER PROGRAMS

This section discusses two kinds of relationships: those between the BLM timber management plan and other BLM plans and programs; and those between the BLM timber management plan and related plans and programs of other parties.

1.8.1 Relationship to the Bureau Planning System

The Bureau planning system is a flexible land use allocation process allowing adaptation to the particular mix of resources within a planning area. As appropriate for locally applicable law, policy and regulation, emphasis may be placed on a particular resource or group of resources.

1.8.1.1 The Bureau Planning System

A prerequisite to the development of a resource management plan for a given area of BLM-administered land is to establish allocations, constraints and objectives for broad categories and subcategories of public land use. These categories are:

-- Intensive land use for commercial, agricultural, industrial, urban, right-of-way, or public purposes.

-- Production of timber or other vegetative products.

-- Production of forage for domestic livestock, wildlife and wild horses and burros.

-- Mineral exploration, development and production.

-- Water production and quality maintenance or modification, soil productivity maintenance, and air quality maintenance or modification.

-- Wildlife habitat preservation and production.

-- Preservation and/or use of cultural and historic resources, scenic and wilderness values, and outdoor recreation opportunities.

The plans are steered by policy provided for all these categories in laws, executive orders, Departmental regulations and Departmental and Bureau manuals.

For each planning area the BLM district maintains a Unit Resource Analysis (URA). This document is a comprehensive compilation of physical data

based upon all available resource inventories, and an analysis of current use, production, condition, trend, capabilities, and opportunities for development or protection in all categories.

Other BLM documents contain the economic, social, infrastructure and institutional information considered relevant to Bureau planning. Included are projections of national, regional and local demand for public land resources and uses and interpretations of the economic, cultural and social significance of these resources to the community and region.

With this background material in hand, the district prepares a Management Framework Plan (MFP) for the area. In step one of MFP preparation, a set of local objectives and action recommendations is established for each category or subcategory of public land use. These recommendations are based on evaluation of the current situation, the technically feasible potential, the social and economic demand, and established policy guidance.

In step one all recommendation areas are mapped so overlaps and conflicts can be identified. Conflicts are, and should be, commonplace. Multiple-use analysis leads to resolution of the conflicts, where resolution is possible, by assessing the impacts of the conflicting recommendations on social, economic and environmental values and identifying alternative solutions to the more significant conflicts. The Bureau has no single objective or absolute policy guide for resolving conflicts. Rather, an attempt is made to achieve multiple-use compromises which will maximize overall public satisfaction.

Finally, all of the relevant analyses are reviewed by the authorized decision makers (District Manager and State Director) who select the alternatives that in aggregate constitute the Management Framework Plan.

One element that takes place throughout the process is public participation. BLM's objective is to ensure that all concerned and interested citizens, either individually or in organized groups, have an opportunity to fully understand the values of the public lands and related alternate uses and to contribute their ideas, knowledge, and proposals during the planning process. This objective results in a variety of meetings and consultations, tailored to the needs of the public involved.

In developing the current proposal, for example, the Bureau invited interested groups, institutions, organizations and individuals to participate in public meetings on development of its Management Framework Plan. These meetings were held both early in the planning process, when the comments could influence the data documents as well as the basic recommendations, and late in the process, after the conflicts had been identified. Based on the comments elicited in these meetings and through other public contacts, the planning documents and, consequently, the proposed land use decisions, were revised as necessary to reflect the public input.

1.8.1.2 Proposed Land Use Decisions in the JSYU

Since July of 1975 all reinventory and preliminary planning steps have been accomplished for the JSYU. The following sections outline

the proposed decisions of the Josephine Management Framework Plan. These were reviewed at public meetings in late July of 1977 and written comments solicited.

When final MFP decisions are made (see page F-1), they will form the management guidelines within which specific action plans are formulated. Annual or multi-year timber harvest, reforestation, herbicide, and other forest practice plans will be developed with the approved management prescriptions in mind.

High Intensity Forest Management Lands

The following sets of tables display the array of issues which were addressed in the Josephine Management Framework Plan for the high intensity category of commercial forest land. Table 1-9 shows resolution of resource conflicts which reduced the land area allocated to high intensity timber production. Table 1-10 shows multiple use considerations which constrain timber management on the 222,896 acres that are allocated to high intensity timber production. Table 1-11 shows proposals for enhancement of non-timber resource values which were not adopted.

In each table brief rationale for the proposed decision is given. The complete Josephine MFP is available for review in the Medford District Office.

Table I - 9

Proposed Decisions Allocating Commercial Forest Land To Use Other Than Timber Management

ISSUE I: STREAM BUFFERS; The effects of streamside timber harvest on Wildlife, Fishery, Water Quality, and Recreation values.

A fisheries recommendation is to leave a 200 ft. undisturbed buffer on both sides of all Class I streams and a 50 ft. buffer on those Class II streams known to support native trout populations.

A recreation recommendation calls for a 200 ft. undisturbed buffer next to those Class I streams used for fishing and collecting.

A watershed recommendation calls for a 100-200 ft. undisturbed buffer on each side of major perennial streams, a 20-50 ft. buffer along minor perennial streams and a 10-30 ft. buffer next to important intermittent streams.

A wildlife recommendation is to maintain a 200 ft. undisturbed buffer along each side of Class I streams.

Alternatives Considered

	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Class I Streams			
a. Buffer Width	0	200 ft.	100 ft.
b. Buffer Type		No harvest	Salvage of dead timber
2. Selected Class II Streams			
a. Buffer Width	0	50 ft.	50 ft.
b. Buffer Type		No harvest	Protective shelterwood
3. Other Class II Streams			
a. Buffer Width	0	20 ft.	0
b. Buffer Type		No harvest	Harvest commercial species; maintain stream shade by preserving other vegetation; no felling or yarding through stream
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management	0	13,400 Ac (Class I & II Streams)	1,600 Ac (Class I streams only)
b. Reduction in annual timber harvest	0	1144.04 cu.ft. (5835 M bd.ft.) (Class I & II Streams)	146.64 M cu.ft. (748 M bd.ft.) (Class I & II Streams)
c. Reduction in annual local personal income	0	Approximately $1,100,000	Approximately $140,000
d. Loss of job opportunities	0	Approximately 100	Approximately 13
2. Fisheries			
a. Effect on cold-water fisheries in Class I streams	Converted to warmwater, non-game fish species	Maintained or enhanced	Retained with no measurable loss
b. Effect on trout fisheries in Class II streams	Eliminated	Maintained or enhanced	Maintained
c. Reduction in annual personal income attributable to commercial & recreational fishing	Approximately $700,000	0	0
d. Loss of job opportunities	Approximately 90	0	0

Table 1-9 (Continued)

	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
3. Riparian zone wildlife habitat			
a. Effect on productivity	Seriously depleted	Preserved	Reasonably maintained
b. Reduction in annual personal income attributable to hunting	Approximately $1,100	0	0
4. Recreation (other than hunting and fishing)			
a. Effect on landscape	Disturbed	Preserved	Reasonably undisturbed
b. Reduction in annual personal income	Approximately $1,000	0	0
5. Effect on water quality, as compared with existing quality	Considerable degradation	Improved	Maintained
6. Total economic effects			
a. Reduction in annual personal income	Approximately $702,100	Approximately $1,100,000	Approximately $140,000
b. Loss of job opportunities	Approximately 90	Approximately 100	Approximately 13

Rationale of Proposed Decision;

Buffer strips as proposed provide reasonable protection to other resources while maintaining emphasis on timber management. Harvest is allowed in accordance with criteria wherein stream protection is the dominant consideration. Stream classification is the prime determinant in setting level of harvest which may be allowed within a buffer. Minimum adverse economic effect is attained with the proposed allocation.

Table 1-9 (Continued)

ISSUE II: VRM CLASS II LANDS; Pertains to implementation of Visual Resource Management Class II objectives (see Appendix C).

The VRM recommendation for Class II lands is that vegetation manipulation projects be designed to repeat features of a natural landscape so as to not be obvious to the casual observer. There are approximately 32,000 acres within the JSYU identified as Class II. Approximately 3,000 acres are high intensity timber management lands and fall within the visual foreground when viewed from the Rogue Wild River (1,300 acres) or major highways (1,700 acres).

A wildlife recommendation calls for prohibition of disruptive activities in the vicinity of crucial wildlife habitat areas and noted the Rogue Wild River area as critical habitat for bear and cougar.

Alternatives Considered

	Maximum Timber Production	Maximum Recommended Protection of Visual Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Land Allocation	3,000 acres for high intensity timber management	No acres removed from timber production base	Reclassify 1,300 acres adjacent to Rogue Wild & Scenic River to VRM Class I
2. Harvest Practices	Clearcut or 2-stage shelterwood	Protective shelterwood harvest.	1,300 acres no harvest 1,700 acres protective shelterwood
B. Effects			
1. Timber			
a. Reduction in annual harvest	0	38.43 M cu.ft. (196 M bd.ft.)	123.33 M cu.ft. (629 M bd.ft.)
b. Reduction in annual local personal income	0	Approx. $37,000	Approx. $118,000
c. Loss of job opportunities	0	Approx. 3	Approx. 11
2. Visual Resources Ability to meet Class II objectives	Serious conflicts, harvested sites would dominate the landscape	Harvested areas not obvious to casual observer.	Meets objectives along highways; exceeds Class II objectives along Rogue Wild River
3. Wildlife Habitat	No protection of old-growth timber habitat type	No old-growth habitat preserved.	Bear and cougar habitat preserved.

Rationale of Proposed Decision;

Reclassification of visual foreground outside Rogue Wild River corridor to VRM Class I maintains the pristine nature of the river environment since no harvest is permitted from VRM Class I lands. Old growth timber habitat type is provided for bear and cougar. The proposed reduction in annual timber harvest of 123.33 M cu.ft. is warranted to protect the visual resources.

Visual foreground visible from major highways is protected by use of protective shelterwood harvest technique at a minimum cost to timber production capability. With careful planning timber sales can be laid out and harvested in Class II visual background without creating a visual intrusion.

Table 1-9 (Continued)

ISSUE III: THREATENED OR ENDANGERED SPECIES; The effects of timber harvest on threatened or endangered animals or plants.

A wildlife recommendation is that an undisturbed buffer of at least 10 chains (660 feet) be maintained around the nests of threatened raptor species. Eleven nests of spotted owls, the only raptor species listed as "threatened with endangerment" (Oregon Department of Fish & Wildlife, 1976) known to exist in the area, have been located on high intensity lands in the JSYU. The total area for eleven buffers of 10 chains each would be approximately 440 acres.

A recreation recommendation calls for the preservation of unusual plant communities containing threatened or endangered plants such as the pitcher-plant and chain fern.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Spotted Owl Nest Sites			
a. Land Allocation	440 acres for high intensity timber management	440 acres removed from timber production base	440 acres removed from timber production base
b. Harvest Practices	Clearcut or 2-stage shelterwood	No harvest	No harvest
2. Botanical Sightseeing Areas			
a. Land Allocation	250 acres for high intensity timber management	250 acres removed from timber production base	250 acres removed from timber production base
b. Harvest Practices	Clearcut or 2-stage shelterwood	No harvest	No harvest
B. Effects			
1. Timber			
a. Reduction in land allocated to timber mgmt.	None	690 acres	690 acres
b. Reduction in annual timber harvest	None	58.64 M cu.ft. (299 M bd.ft.)	58.64 M cu.ft. (299 M bd.ft.)
c. Reduction in annual local personal income	None	Approximately $56,000	Approximately $56,000
d. Loss of job opportunities	No loss	Approximately 5	Approximately 5
2. Wildlife	Possible loss of eleven pairs of spotted owls and their offspring.	Preserves 440 acres of old-growth habitat necessary for spotted owl nesting.	Preserves 440 acres of old-growth habitat necessary for spotted owl nesting.
3. Recreation	Reduce or eliminate unusual plant communities containing threatened or endangered species.	Preserves 250 acres of commercial forest land containing unusual plant communities and designated as Botanical Sightseeing Areas.	Preserves 250 acres of commercial forest land containing unusual plant communities and designated as Botanical Sightseeing Areas.

Rationale of Proposed Decision;

Northern spotted owls require stands of old-growth timber to nest and raise their offspring. The proposed decision of maintaining undisturbed buffers around known nesting sites, (thereby reducing the timber production base by 440 acres and the annual timber harvest by 37.39 M cu.ft.) is warranted to provide adequate protection until more is known about the habitat requirements of this threatened species.

Approximately 2,080 acres have been identified as having unique botanical values in the Josephine SYU (250 acres of which are classified as high intensity land). The proposed decision of withdrawing these 250 acres and reducing the annual timber harvest by 21.25 M cu.ft. is warranted to protect the threatened or endangered plant species contained therein.

Table I-10

Multiple Use Constraints on Lands Allocated to Timber Production

ISSUE I: ROADLESS AREAS; The effects of timber harvest on 3,590 acres having the potential for designation as primitive areas.

A recreation recommendation is that no activities be conducted within 3,590 acres identified as unroaded until studies are completed to determine their potential for primitive status.

A wildlife recommendation is that existing bear and cougar habitat adjacent to the Rogue Wild River be maintained in a roadless condition.

	Alternatives Considered: Maximum Timber Production	Alternatives Considered: Maximum Recommended Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Land Allocated to Proposed Primitive Study Area	None	3,590 acres.	Redefine proposed study area boundary to exclude existing roads and previously harvested areas. New boundary encompasses 1,590 acres of high intensity land.
2. Timber Harvest	Harvest 3,590 acres within proposed primitive study area.	Leave land in timber production base, but do not harvest on 3,590 acres within proposed primitive study area.	Leave land in timber production base, but do not harvest on 1,590 acres until determination of primitive status is complete.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management	None	3,590 acres temporarily	1,590 acres temporarily.
b. Reduction in annual timber harvest.	None	None	None
c. Reduction in annual local personal income.	None	None	None
d. Loss of job opportunities	No loss	No loss	No loss
2. Primitive Environment	Significantly diminished	Maintained on 3,590 acres until study has been completed.	Maintained on 1,590 acres until study has been completed.
3. Wildlife			
a. Preservation of old-growth timber.	No old-growth timber preserved.	3,590 acres of old-growth timber taken out of timber production base until study is completed.	1,590 acres of old-growth timber preserved until study is complete.
b. Road encroachment on bear and cougar habitat.	Significant road encroachment.	No road encroachment.	Some road encroachment on lands outside of revised study boundary.

Rationale of Proposed Decision:

The original 3,590 acres recommended for study included roads and cutover areas. The reduced area of 1,590 acres does not.

The proposed decision to delay timber harvest on these 1,590 acres will maintain the pristine nature of these lands until the study leads to a determination of their status as primitive areas. After the study has been completed the timber production land base can be adjusted to exclude any lands found to be appropriate for primitive area designation.

Table 1-10 (Continued)

ISSUE II: Potential Recreation Sites; The effects of timber management activities on sites having the potential for recreation development.

A recreation recommendation calls for a study to re-evaluate inventoried potential campgrounds and/or picnic sites and to determine whether their continued protection is required. Total acreage recommended for study includes 1,300 acres of high intensity land.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Timber Harvest	Harvest 1,300 acres identified as having recreation site potential.	Leave land in timber production base, but do not harvest on 1,300 acres pending detailed re-evaluation of each potential site.	Leave land in timber production base, but do not harvest on 1,300 acres pending detailed re-evaluation of each potential site.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management.	None	1,300 acres (temporarily)	1,300 acres (temporarily)
b. Reduction in annual timber harvest.	None	None	None
c. Reduction in annual local personal income.	None	None	None
d. Loss of job opportunities.	No loss	No loss	No loss
2. Recreation Site Quality	Severely diminished	Maintained until re-evaluations have been completed.	Maintained until re-evaluations have been completed.
3. Wildlife	No old-growth timber preserved.	1,300 acres of old-growth timber preserved pending re-evaluation studies.	1,300 acres of old-growth timber preserved pending re-evaluation studies.

Rationale of Proposed Decision:

The proposed decision to delay harvest on 1,300 acres of potential recreation sites will preserve the quality of these areas until a review can be made. After the study has been completed the timber production land base can be adjusted to exclude those lands found to be appropriate for eventual recreation site development.

Table 1-10 (Continued)

ISSUE III: ELK WINTER RANGE; The effects of timber management activities on areas crucial to elk survival during the winter months.

A wildlife recommendation is to schedule harvest operations so that 25 to 40 per cent of the crucial elk winter range (approx. 5,000 acres) will be maintained in a closed canopy condition with cover at least 50 feet high.

	Alternatives Considered		
	Maximum Timber Production	Recommended Maximum Protection of Elk Winter Range	Proposed Decision
A. Characteristics of the Alternative			
1. Timber Harvest	Harvest without regard to impact on elk winter range.	Maintain 25-40% of crucial elk winter range in a closed canopy condition condition with trees at least 50 feet high.	Harvest within elk winter ranges. Stagger cutting units to provide 25-40% in a closed canopy condition with trees at least 50 feet high.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management.	None	None	None
b. Reduction in annual timber harvest	None	64.12 M.cu.ft.(327 M.bd.ft.)	None
c. Reduction in annual local personal income	None	Approx. $61,000	None
d. Loss of job opportunities	No loss	Approx. 6	No loss
2. Wildlife			
a. Elk population	Probable decrease due to accelerated harvest of old-growth timber.	Probable increase since closed canopy habitat would be preserved.	Should be maintained.

Rationale of Proposed Decision:

Elk need areas on the winter range which have reduced snow depths for feeding and protection. The proposed decision to stagger cutting units will provide closed canopy conditions to supply this need and will also provide thermal cover.

Table 1-10 (Continued)

ISSUE IV: VRM CLASS III LANDS; The effects of timber harvest on areas identified as Visual Resource Management (VRM) Class III lands.

A VRM recommendation is that, although timber management activities may be visible on areas possessing average scenic qualities, they should not become a dominant feature on such areas.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection Of Visual Resources	Proposed Decision
A. Charactertistics of the Alternative			
1. Timber Harvest	Harvest 30,000 acres of VRM Class III lands	Accomplish vegetative manipulations on VRM Class III lands in such a manner that they are not dominant features on the landscape.	Harvest 30,000 acres of VRM Class III lands using techniques, such as limiting the size of units to 40 acres and irregular boundaries, which will prevent harvested areas from becoming a dominant feature on the landscape.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management.	None	None	None
b. Reduction in annual timber harvest.	None	None	None
c. Reduction in annual local personal income.	None	None	None
d. Loss of job opportunities.	No loss	No loss	No loss
2. Landscape	Harvested areas would dominate landscape.	Harvested areas would not dominate landscape.	Harvested areas would not dominate landscape.

Rationale of Proposed Decision:

In order to preserve the scenic quality of VRM Class III lands management actions should not be a dominant feature and the shapes, colors, lines, etc. of activities should be complementary to the existing landscape.

The proposed decision to use harvest techniques such as limiting the size of units to 40 acres with irregular boundaries, so that the scenic quality of these lands will not be significantly affected, will not have adverse economic impacts.

Table 1-10 (Continued)

ISSUE V: ROGUE "WILD" RIVER; The effects of timber harvest on the wild segment of the Rogue River.

A recreation recommendation is that audible intrusions from timber harvesting beyond the visual foreground of the Rogue "Wild" River should be prohibited during the summer season (June 12 to September 12).

Alternatives Considered

	Maximum Timber Production	Maximum Recommended Protection of Rogue "Wild" River Corridor	Proposed Decision
A. Characteristics of the Alternative			
1. Timber Harvest	Harvest throughout the year, disregarding audible intrusions.	No harvest between June 12 and September 12, resulting in a 40 per cent reduction in average harvesting season.	Harvest throughout the year.
B. Effects			
a. Reduction in annual harvest	None	None	None
b. Reduction in annual local personal income	None	None	None
c. Loss of job opportunites	No loss	No loss	No loss
2. Rogue "Wild" River Environment.	Constant audible intrusions associated with timber harvest.	No audible intrusions during June 12 - September 12.	Some audible intrusions during summer months.

Rationale of Proposed Decision:

Timber harvest operations will cause audible intrusions but will not change the pristine nature of the river environment any more than intrusions caused by jet aircraft flying overhead.

Table 1-10 (Continued)

ISSUE VI: STREAM BUFFERS- Herbicide Treatment, Fertilization and Other Intensive Practices; The effects of using chemical herbicides and fertilizers and employing other intensive forestry practices in the vicinity of streams.

A water quality recommendation is to maintain a 200 foot no-spray and no-fertilize buffer on each side of all Class I and Class II streams.

A wildlife recommendation calls for the maintenance of an undisturbed buffer strip of 200 feet on each side of Class I streams and 50 feet on each side of Class II streams by prohibiting all intensive forestry practices in these areas.

Alternatives Considered

	Maximum Timber Production	Maximum Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Size and Location of Stream Buffers			
a. Application of chemical herbicides and fertilizers	No stream buffers	200 feet-All perennial streams.	100 feet-All perennial streams.
b. Mechanical site preparation and controlled burning	No stream buffers	200 feet-Class I streams 50 feet-Important Class II streams 25 feet-Other streams	100 feet-Class I streams 50 feet-Important Class II streams 20 feet-Other Class II streams
c. Precommercial and commercial thinning	No stream buffers	200 feet-Class I streams 50 feet-Important Class II streams 20 feet-Other streams	100 feet-Class I streams
B. Effects			
1. Timber			
a. Reduction in annual timber harvest	None	117.25 M.cu.ft. (598 M.bd.ft)	None *
b. Reduction in annual local personal income	None	Approx. $112,000	None *
c. Loss of job opportunities	No loss	Approx. 10	None *
2. Fisheries	Considerable losses	No adverse effect.	Minimal effect.
3. Water Quality	Considerable degradation	Improved	Maintained

Rationale of Proposed Decision:

The proposed decision to provide stream buffers of various widths (depending on stream class and the type of intensive management practice being conducted) will sufficiently protect the streams and riparian habitat.

* No additional effects. Buffer strips removed from allowable cut base (see Table 1-9, Issue I).

Table 1-10 (Continued)

ISSUE VII: HERBICIDE TREATMENT ON VRM CLASS II AND CLASS III LANDS; The effect of using chemical herbicides for site preparation of Visual Resource Management Class II and Class III Lands.

VRM recommendation is that vegetative manipulations on VRM Class II land not be obvious to the casual observer and that vegetative manipulation on VRM Class III land not be a dominant feature of the landscape.

Alternatives Considered

	Maximum Timber Production	Maximum Recommended Protection of Visual Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Application of chemical herbicides.	Unrestricted use of chemical herbicides on 33,000 acres of VRM Class II and Class III lands.	Spray 33,000 acres of VRM Class II and Class III lands using techniques such as laying out project boundaries so they are irregular in shape and blend in with the natural contours of the landscape.	Spray 33,000 acres of VRM Class II and Class III lands using techniques such as laying out project boundaries so they are irregular in shape and blend in with the natural contours of the landscape.
B. Effects			
1. Timber			
a. Reduction in annual timber harvest	None	Minor	None
b. Reduction in annual local personal income	None	Modest	None
c. Loss of job opportunities	No loss	Minor	No loss
2. Landscape	Treated areas would dominate landscape	Entire 33,000 acres left in untreated condition	Treated areas would not dominate landscape

Rationale of Proposed Decision:

Herbicide usage is necessary to achieve the proposed level of harvest with the measures indicated in A above, visual impacts will be minimized and criteria for the respective VRM classes met.

Table 1-10 (Continued)

ISSUE VIII: SEEDING FOR WILDLIFE FORAGE; The effects of seeding and fertilizing roadsides and other disturbed areas to increase wildlife forage.

A wildlife recommendation is to increase wildlife forage by removing undesirable vegetation and establishing palatable grasses, forbs and legumes in existing meadows, other natural openings, roadsides, landings and skid roads.

	Alternatives Considered		
	Maximum Timber Production	Maximum Protection of other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Application of seed and fertilizer to increase wildlife forage	Establish plant species which provide wildlife forage in existing meadows (except those occupying former forested areas). Seed palatable grasses on other disturbed sites and natural openings except on skid roads or cable yarding roads under 3,000 feet in elevation.	Rehabilitate all disturbed sites and natural openings (including areas formerly occupied by forest trees) by establishing palatable grasses, forbs and legumes.	Establish palatable grasses, forbs and legumes in those areas where moisture competition with tree seedlings is not a problem e.g. skid roads above 3,000 feet, and cut or fill slopes of roads and landings.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management	None	Modest	None
b. Reduction in annual timber harvest	None	Minor	None
c. Reduction in annual local personal income	None	Modest	None
d. Loss of job opportunities	No loss	Minor	No loss
2. Wildlife	Minimum benefit to wildlife	Maximum benefit to wildlife	Significant benefit to wildlife.

Rationale of Proposed Decision:

Meadows and other natural openings are important habitat components of many wildlife species. The proposed decision is to establish vegetation desirable for wildlife forage and cover in those areas where competition with tree seedlings is not a factor e.g. roadside cuts and fills, landings, and skid roads above 3,000 feet in elevation (moisture and temperature are critical elements below 3,000 feet, resulting in vegetative competition with trees.)

TABLE 1-11

Multiple Use Constraints Considered but not Proposed for Lands Allocated to Timber Production

ISSUE I: DEER WINTER RANGE: The effect of timber harvest practices on the production of deer forage

The timber management recommendation is that 74 per cent of the area proposed for timber harvest be cut with a shelterwood harvest system because it would take too long to reforest the lands if they were clearcut. The wildlife recommendation is that the amount of land proposed for clearcutting in deer winter range be increased because more deer forage is produced in clearcut areas than in areas where timber is harvested under a shelterwood or other partial cutting system.

Alternatives Considered

	Maximum Timber Production	Maximum Production of Deer Forage	Proposed Decision
A. Characteristics of the Alternative			
Areas of commercial forest land harvested by clearcutting and shelterwood cutting in first ten years following adoption of proposed timber management program			
a. Clearcut	5,000 acres	More than 5,000 acres	5,000 acres
b. Shelterwood Cut	45,000 acres	Less than 45,000 acres	45,000 acres
B. Effects			
1. Timber			
a. Time required for forest regeneration	Less than 5 years	More than 5 years	Less than 5 years
b. Effect of regeneration lag on amount of land retained in timber production base	Initial acreage retained	Initial acreage retained	Initial acreage retained
c. Effect on annual allowable harvest	Maintained	Reduced 422 bd.ft. for every acre clearcut over 5,000 acres	Maintained
2. Wildlife Habitat			
a. Deer forage produced	Less forage than with alternative involving increased clearcutting	More forage than with alternative involving best combination of harvest practices from silvicultural standpoint	Less forage than with alternative involving increased clearcutting
b. Effect on deer populations	Maintained at current level	Increased above current level	Maintained at current level

Rationale for Proposed Decision;

The proposed decision is to not harvest more timber by clearcutting than provided for in the timber management recommendation. The reasons are (1) the combination of harvest practices recommended for timber management would result in enough deer forage being produced to maintain current deer populations; and (2) clearcutting unsuitable areas would make reforestation within the required period of time unlikely.

Table 1-11 (Continued)

ISSUE II: ARTIFICIAL REFORESTATION: Its effects on upland game habitat

A wildlife recommendation is to provide additional upland game habitat by allowing 25 per cent of each area in which timber is harvested to reforest naturally. On almost all lands in the unit, cutover areas cannot be reforested within a reasonable period of time if brush and grass are not controlled. Reduction of brush and grass reduces the quality of the areas as upland game habitat.

Alternatives Considered

	Maximum Timber Production	Maximum Provision of Upland Game Habitat	Proposed Decision
A. Characteristics of the Alternative			
Per cent of cutover areas allowed to reforest naturally	Less than 25 per cent	25 per cent	Less than 25 per cent
B. Effects			
1. Timber			
a. Timber production on lands allowed to reforest naturally	Full potential of site	Less than potential of site	Full potential of site
b. Effect on annual allowable harvest	Maintained	Could be reduced by as much as 25% or 4.56 MM cu.ft.	Maintained
2. Wildlife Habitat			
a. Area of quality upland game habitat in unit	Maintained at current levels with some increase possible	Increased above current levels	Maintained at current levels, with some increase possible
b. Upland game populations	Maintained at current levels, with some increase possible	Increased above current levels	Maintained at current levels, with some increase possible

Rationale for Proposed Decision;

The proposed decision is to artificially reforest all high intensity management lands harvested in the future. Natural regeneration is the prescription for low intensity lands with approximately 5,000 acres to receive trial harvest. This, plus limited management lands where no harvest is planned, provide considerable upland game habitat.

Low Intensity Forest Management Lands

Trial harvest from low intensity lands is expected to gather empirical data on the actual length of the regeneration period and to determine what practices, if any, are effective to yield regeneration within five years. The proposal involves approximately 500 acres per year during the first decade. Selection of techniques will be made in consultation with appropriate experiment station personnel.

As a basis for design of the trial program, a two-stage shelterwood harvest system will be employed, reforestation will utilize natural seeding. Herbicides may be used for site preparation during good seed years.

Resource conflicts for low intensity lands were essentially the same as those displayed in Tables 1-9 and 1-10 for high intensity lands. Inasmuch as harvest from low intensity lands is a trial program for one decade only, designed to generate specific information, none of the harvest will take place where multiple-use conflict situations are identified. Adequate non-conflict areas are available to allow this program to proceed as planned during the decade.

Limited Management Lands

Lands in this category are excluded from high or low intensity management because of severe regeneration problems or fragile soils. The proposed

decision is for no planned harvest from the 79,471 acres of limited management lands.

Research projects or experimental harvesting are being considered to determine the management practices that might be acceptable on these lands. Some harvesting may be possible, but research projects or less formal study projects will be required before this determination can be made.

Areas of conflict are similar to those of high and low intensity lands. Incidental harvest, should such be necessary, will be strictly governed by environmental assessments specific to the situation.

Minor Forest Products

Sales of minor forest products -- posts, poles, and particularly firewood -- have been an incidental aspect of the timber management program. The demand for firewood, especially by private parties for personal use, has been increasing annually. Some of the demand is met with slash or debris from timber sales.

Management of non-commercial forest land, primarily hardwoods, for firewood production was considered. Protection of oak species for use by cavity-nesting and other wildlife was also considered. Harvesting of firewood traditionally occurs above road cutbanks and within 200 feet of the road.

The proposed decision is to manage hardwood stands for firewood on non-commercial sites with existing road access, except that no cutting would be conducted in streamside buffers and oaks would be managed primarily for wildlife. Commercial firewood sales would be made as demand developed.

1.8.2 Federal, State and Local Government Interactions

The only BLM actions required to implement the proposal are a formal declaration of the allowable cut and an endorsement of the action by the Director of the Bureau. No other Federal, local or State agency must endorse the plan before implementation. However, in the process of plan development a number of governmental agencies were consulted to determine compatibility with their respective plans and interests, and to gain assistance in resolution of potential conflicts.

1.8.2.1 Planning Interactions

The Intergovernmental Cooperation Act of 1968 requires the fullest cooperation and coordination among all levels of government. The law directs all Federal agencies to notify State and local governments of significant project or development plans. This is accomplished through the Oregon State Clearinghouse which distributes project or plan documents to State agencies involved. The Medford District has furnished the clearinghouse with copies of land use planning documents (such as the narratives for the Unit Resource Analysis and Management Framework Plan) and regularly provides annual timber

sales plans. Copies of this environmental statement will also be provided to the clearinghouse.

Under the Federal Land Policy and Management Act of 1976 (FLPMA), BLM is required to coordinate its planning and management with State and local governments and keep apprised of local planning efforts which may conflict with Federal plans. The act further requires BLM to develop land use plans consistent with State and local plans to the maximum extent accorded by Federal law and policy, and to assist in resolving conflicts.

During formulation of the proposal BLM personnel periodically informed local, county, State, and other Federal officials of actions underway and actively solicited their comments. In addition to personal contacts, newsletters describing the progress of JSYU land use planning effort were sent out periodically. When the proposal was developed, special briefings were conducted for officials of the indicated levels of government.

Oregon Senate Bill 100 requires that local governmental units establish a mechanism for cooperating with Federal agencies in the development of comprehensive land use plans. Cities and counties must contact all State and Federal agencies within their jurisdiction for this purpose. All counties and cities in Oregon are required further to develop and adopt comprehensive plans and land use controls consistent with statewide planning goals and guidelines. The regulating authority under SB 100 is the Oregon Land Conservation and Development Commission (LCDC).

The LCDC has specified that a city or county may have only one comprehensive plan and that it must include the plans of all affected special districts, State, and Federal agencies. Although none of the counties have completed revision of their comprehensive plans or gained LCDC approval, BLM routinely reviews and comments on draft plans as they are made available. Although BLM has no authority to enter into binding commitments to be guided by comprehensive plans developed under State law, the mandate of the FLPMA practically assures BLM consistency with State and local comprehensive plans.

1.8.3 Interactions With Other Actions or Proposals

1.8.3.1 BLM Actions or Proposals

In addition to the proposed timber management plan, the Bureau has many ongoing subsidiary programs in the JSYU aimed at developing, enhancing or conserving resources other than timber. Major program areas include land exchanges, leasing for cattle grazing, watershed management, recreation management, and wildlife and fish habitat management.

The proposed timber management plan was evolved through the Bureau's planning system wherein conflicts or potential conflicts among resource uses were resolved. The proposed action, therefore, is both compatible with other BLM programs and consistent with the major goal of timber management.

1.8.3.2 Other Agency Actions or Proposals

In addition to BLM, other agencies have jurisdiction over lands within and adjacent to the JSYU. BLM cooperates with these agencies as far as possible to avoid conflicts and to insure wise use of natural resources. BLM interactions with these agencies and their current projects or proposals are described below.

Timber Management Plans

Most of southwestern Oregon is timber-producing land. Jurisdictions include the United States Forest Service, National Park Service, State of Oregon, the counties, and private individuals and companies, in addition to BLM. Each entity approaches management of timber lands differently although most periodically prepare internal or public plans for their management.

Summary data of timber harvest and management treatments has been gathered for the two river basins of which the JSYU is a part. BLM administers approximately 30 per cent of Rogue River Basin. Over 353,000 acres lie within the JSYU and the balance is within the Jackson and Klamath Sustained Yield Units. Portions of the Rogue River and Siskiyou National Forests are also within the basin. Table 1-12 shows the estimated acreage of annual timber management treatments within the basin based on recent years averages by jurisdiction. The State and private column of the table includes only major private landowners as no data are available for small timberland ownerships.

Annual Timber Harvest and Management Treatments
by Major Ownership

Rogue River Basin (Approximately 2,421,000 acres)

	BLM	USFS	State & Private	County	Total
Present Harvest (MM bd.ft.)	232	269	171	3	675
Shelterwood Harvest					
Acres	8,000	7,850	49,400	0	65,250
Volume (MM bd.ft.)	212	143	34	0	389
Clearcut Harvest					
Acres	500	4,700	12,350	0	17,550
Volume (MM bd.ft.)	15	118	137	0	270
Site Preparation (acres)					
Herbicide	450	400	1,200	0	2,050
Mechanical Scarification	50	550	1,000	0	1,600
Slash Disposal (acres)	800	-	2,000	35	2,835
Herbicide Release (ac.)	450	2,600	2,000	-	5,050
Planting (acres)	2,800	7,550	3,000	540	13,890
Precommercial Thinning (acres)	400	1,300	2,500	2,700	6,900
Commercial Thinning (acres)	200	650	2,000	0	2,850
Fertilization (acres)	0	0	0	20	20
Road Construction (mi.)	100	107	20	2	229

Source: Based on estimates provided by: BLM - Medford District; USFS - Rogue River National Forest and Siskiyou National Forest Supervisor's Office; Oregon State Forestry Department - Southwest Oregon Unit; and the Josephine County Forestry Department.

A similar situation exists within the South Umpqua River Basin. BLM administers approximately 25 per cent of the basin. Of this 72,500 acres are within the JSYU and the balance is in the Roseburg District. Estimated treatments in the South Umpqua drainage are as shown in Table 1-13.

Within the governmental sphere, coordination of planning is achieved through interagency involvement pursuant to authorities discussed in Section 1.8.2.1. Private actions on private lands are regulated, as provided by applicable State law, by Oregon agencies responsible for implementation of each statue.

Other Agency Roles in BLM Actions

Authorities and responsibilities of other agencies are recognized in the preparation of specific management actions to be carried out under provisions of the proposal. While no other agency must endorse the overall management plan prior to its implementation (Section 1.8.2), the agencies discussed below have a role, or provide guidance, in planning and carrying out the treatments listed in Table 1-1.

Federal Agencies

The Josephine SYU shares in part a common boundary with the Siskiyou, Rogue River and Umpqua National Forests. Coordination between the BLM and Forest Service is continuous with regard to management of the Rogue National

Table 1-13

Annual Timber Harvest and Management Treatments
by Major Ownership

South Umpqua River Basin (Approximately 1,069,000 acres)

	BLM	USFS	State & Private	Total
Present Harvest (MM bd.ft.)	106	120	9	235
Shelterwood Harvest				
Acres	700	1,700	100	2,500
Volume (MM bd.ft.)	10	50	2	62
Clearcut Harvest				
Acres	2,500	1,000	150	3,650
Volume (MM bd.ft.)	87	40	5	132
Site Preparation (acres)				
Herbicide	3,200	1,300	200	4,700
Mechanical scarification	100	50	50	200
Slash Disposal (acres)	2,000	7,000	250	9,250
Herbicide Release (acres)	1,200	1,300	150	2,650
Planting (acres)	3,400	2,500	250	6,150
Precommercial Thinning (acres)	500	400	400	1,300
Commercial Thinning (acres)	0	200	0	200
Fertilization (acres)	150	900	0	1,050
Road Construction (miles)	36	60	4	100

Source: Based on estimates provided by: BLM - Medford and Roseburg Districts; USFS - Tiller Ranger District, (Umpqua National Forest); and the Oregon State Forestry Department - Southwest Oregon Unit.

Wild and Scenic River Project. Periodic general coordination between the BLM District Manager and the Forest Supervisors is routine. Specific project and program coordination takes place as needed between all management levels of each agency and also between resource specialists. A cooperative agreement provides for interagency road use and another agreement relates to range resource matters.

The Army Corps of Engineers has the authority, under Section 404 of the Federal Water Pollution Control Act amendments of 1972, to regulate the discharge of dredged or fill materials into any wetlands or streams of the United States with flow in excess of five cubic feet per second. Normal silvicultural practices are exempt from regulation. Based on the adequacy of BLM environment protection practices the Corps has issued BLM a general permit for all such activities. Under the permit BLM provides the Corps, and certain environmental review agencies, with advance notice of specific projects.

The Bureau of Reclamation is active in investigation and development of water resources in the Medford District. Existing water impoundments such as Howard Prairie Lake, Emigrant Lake, Hyatt Lake and Agate Lake are examples of BR projects for irrigation purposes in Jackson County. The Merlin project is the only proposed Bureau of Reclamation project in the Josephine SYU which seems to have much potential for construction. Contact with Bureau of Reclamation has been infrequent, but should increase as the Merlin project progresses.

The principal role of the Fish and Wildlife Service in BLM management is an advisory one in the fields of wildlife management and endangered

species protection. The BLM, in cooperation with the Oregon Department of Fish and Wildlife, solicits FWS advice for mammal population control work. FWS - BLM projects are governed by a Memorandum of Understanding.

The Environmental Protection Agency (EPA) furnishes guidance to BLM in such matters as the abatement of water pollution resulting from timber harvesting and road construction.

The EPA is the agency responsible for obtaining uniform compliance with Section 208 of the Federal Water Pollution Control Act Amendments of 1972. In each state the Governor is responsible for formulation of quality standards to the satisfaction of EPA.

The principal Small Business Administration (SBA) program interacting with BLM management in the JSYU is the timber sale set-aside program. The purpose of the program is to assure that small businesses (fewer than 500 employees) have the opportunity to purchase their historic share of timber sale offerings. The base period for analysis is the years 1968 to 1972.

On a semi-annual basis, small business timber purchases for the past year are reviewed. If small business has not purchased at least 90 per cent of the base level timber volume, the set-aside program is activated. SBA, subject to BLM concurrence, determines which sales are set aside for small business, and larger firms may not purchase them unless small business fails to do so.

The JSYU is designated as a marketing area for analysis of small business success in purchasing timber. At present the set-aside program is activated in the JSYU since small business has not purchased its fair share in the preceding review period.

SBA also makes loans to small business enterprise. Involvement by BLM in SBA-Operator matters is limited to loan payment collections for SBA through BLM contracts involving only road construction. Incidence of SBA loans on BLM road construction contracts is infrequent to date.

The Federal Highway Administration (FHWA) is responsible for survey, design, and construction of major roads and bridge projects for BLM. These are paid for with appropriate monies collected from road users and supplemented with appropriated funds.

Coordination of BLM Access Road Projects is accomplished through the District Engineer and his staff in cooperation with the Oregon State Office of BLM and the FHWA.

State Government

The Oregon State Forester, by means of the Forest Protection Act of 1972, regulates timber harvest methods and supportive practices on all non-federal lands within the SYU. Minimum standards are prescribed relating to the following forest practices:

- Reforestation of economically suitable lands.
- Road construction and maintenance on forest land.
- Harvesting of particular tree species.
- Chemical applications.
- Slash disposal.

Although Federal agencies are not bound by State forest practice rules, Bureau minimum standards meet or exceed State rules. The BLM and USFS, acting jointly, have entered into a memorandum of understanding with the State Forester in this regard. Timber sale contracts provide for the purchasers, or their delegated representatives, to obtain permits for the operation of power-driven machinery from the Oregon State Department of Forestry (OSDF).

Purchasers must obtain burning permits from the OSDF in conjunction with required slash disposal operations unless burning is directly supervised by OSDF personnel. Slash burning is allowed to begin only when smoke dispersal conditions are favorable.

BLM is a cooperator in the statewide smoke management plan administered by the Oregon State Forester. The primary objective of the plan is to keep smoke out of population centers.

OSDF is the primary contractor for fire protection of public lands administered by BLM in the JSYU. That department undertakes presuppression and suppression actions for all lands in the area.

The recently published Forestry Program for Oregon (Oregon State Board of Forestry, 1977) asks for certain levels of timber supply from Federally administered forests. The ability of the JSYU to meet the requested level of production is discussed in Chapter 8 as an alternative to the proposal.

Management of wildlife, including fishes, within the JSYU is the responsibility of the Oregon Department of Fish and Wildlife. BLM, in management of lands under its jurisdiction, considers wildlife habitat. Cooperative agreements describe the relationship between habitat and animals and the responsibilities of the two agencies.

The State Scenic Waterways unit of the Oregon Division of Highways, is responsible for administration of the Stae Scenic Waterways Act. The State Marine Board is responsible for enforcement of regulations regarding public use of surface waters in Oregon. Both BLM and the Forest Service are in continuous contact with these two state agencies concerning management of the Rogue Wild and Scenic River.

The Oregon Department of Environmental Quality (DEQ) has been delegated the responsibility to develop air, water and noise quality standards based on broad EPA criteria. Standards relate to both Federal and non-Federal lands. BLM cooperates with DEQ to insure that Bureau programs are considered in the formulation of standards and that BLM activities meet or exceed prescribed state standards for air, water and noise quality.

The Oregon Workmen's Compensation Board formulates and enforce safety codes for places of employment. Chapter 16 of the code specifically applies to logging. BLM timber sale contracts require all operations in connection with the contract to be conducted in compliance with applicable Federal, State and local safety codes.

County Government

BLM involvement with the five counties in the SYU is largely via the several boards of county commissioners. Through these bodies, county governments participate in planning for land use, road construction, and recreational developments on public lands administered by BLM. They also develop and operate recreation sites on public lands leased under the Recreational and Public Purposes Act.

County planning and zoning programs within the SYU are fully described in the Josephine Planning Area Analysis which is available for review in the BLM Medford District office. No county containing a portion of the JSYU has a revised county comprehensive plan which has been approved by the Land Conservation and Development Commission (LCDC). Each of the five counties which contain a portion of the JSYU use slightly different names for the proposed zone designation encompassing public lands administered by BLM. No matter what the zones are titled, however, they all provide for timber production, grazing and related uses including recreation. County zoning in each case is compatible with current and anticipated BLM land use programs.

Regional Agencies

The Medford District works closely with the Rogue Valley Council of Governments (COG) on planning carried out under Section 208 of the Federal Water Pollution Control Act. Several agencies are involved in water quality monitoring, and the Rogue Valley COG coordinates their efforts. BLM supports the statewide 208 Water Quality Program and cooperates fully with Oregon DEQ to insure that the program reaches its objectives.

1.8.4 Requirements For Further Environmental Assessment

It is the policy of BLM to conduct an assessment of any action which could have an impact on components of the environment. Interdisciplinary assessment in accordance with BLM Manual 1791 is flexible, depending on the magnitude of the specific action.

The first of two major goals in an environmental assessment is to determine the significance of the action. When the analysis discloses that significant impacts cannot be readily mitigated or that the proposed action involves a sensitive issue, a recommendation for preparation of a full environmental statement may be appropriate. Such recommendations are forwarded through channels to the Director of BLM. For instance, preparation of an environmental statement on BLM's western Oregon herbicide program has been approved and work is under way.

In most cases, however, an environmental assessment will either identify modest impacts or lead to mitigation resulting in modest net impacts, thus precluding the need for a statement. With problems and conflicts identified through analysis, it is possible to design the proposed project in an environmentally sensible manner. Where the action is to be accomplished by a contractor, the environmental analysis is a primary means for determining appropriate contract stipulations, and this is the second major goal of the assessment.

Standard procedure requires preparation of an assessment of every proposed timber sale and forest development project. Similar actions may be grouped into one assessment. Examples of timber sale environmental assessment are available upon request from the Office of the State Director, Bureau of Land Management, P. O. Box 2965, Portland, Oregon 97208.

1.9 COMPARISON WITH PRESENT ALLOWABLE CUT

The present allowable cut plan for western Oregon was declared April 7, 1971, for application beginning July 1, 1971 (36 FR 6906). For all public lands administered by BLM in western Oregon the declared annual allowable cut is 1.172 billion board feet, Scribner equivalent. Based on forest resource conditions, multiple use considerations and environmental constraints specific to the Josephine Sustained Yield Unit, the allowable cut for the SYU is 146 million board feet per year (BLM, 1970).

In comparing the 1971 declaration to the proposal, only the allowable cut on high intensity land may be considered. Volume from trial harvest on low intensity lands, while part of the proposal, was not arrived at through the allowable cut planning process.

In 1971 the timber production base (corresponds to high intensity lands of the proposal) was determined to be 334,500 acres following exclusions for multiple use considerations. This figure compares to 222,896 acres in the proposed high intensity category, a difference of 33 per cent. Figures 1-5 and 1-6 display land allocations to the timber production base in 1971 and in the proposal, respectively.

The present and proposed harvest levels were computed with field-generated data obtained through inventories. Average volume per acre and average site index are approximately the same. Empiric yield curves which show the average volume per acre by age class (Figure 1-7) display the similarity of results from the two inventories.

Age class distribution, figured on a percentage basis since acreage allocated to high intensity timber management changed, is practically the same. The distribution is as follows:

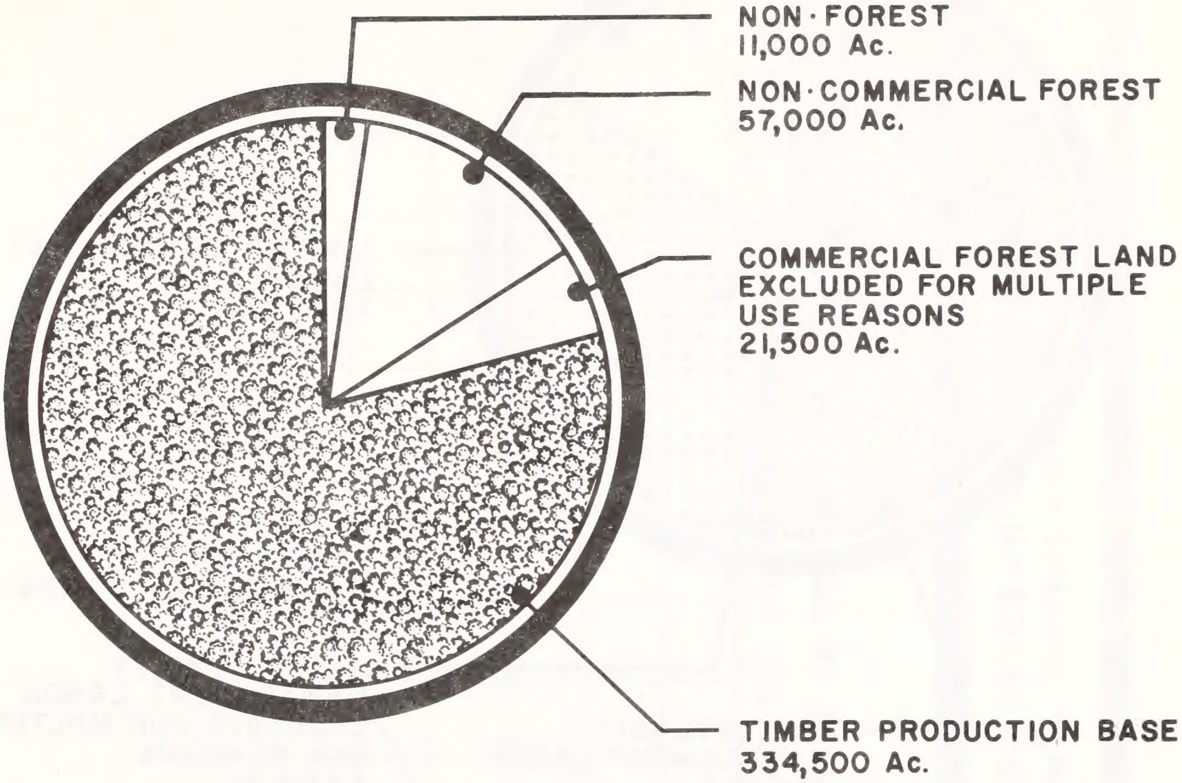


Figure 1-5 ACREAGE DISTRIBUTION IN THE 1971 ALLOWABLE CUT COMPUTATION

INVENTORY DATA:

- Total Inventory Volume—7,612,000 MBF Scribner Equivalent (23 MBF/Acre)
- Average Annual Yield Per Acre (base)— 436 BF Scribner Equivalent
- Total Area of SYU— 424,000 Acres
- Average Site Index—114
- Stand Density Index— 68 Per cent

ASSUMPTIONS:

- Regeneration Lag—0 Years
- 1st Decade Intensive Management Practices—None
- Ultimate Per cent of Total Acreage to Undergo Pre-commercial and Commercial Thinning—49 Per cent
- Ultimate Per cent of Total Acreage to be Planted with Genetically Improved Stock—24 Per cent

SOURCE: BLM, 1971

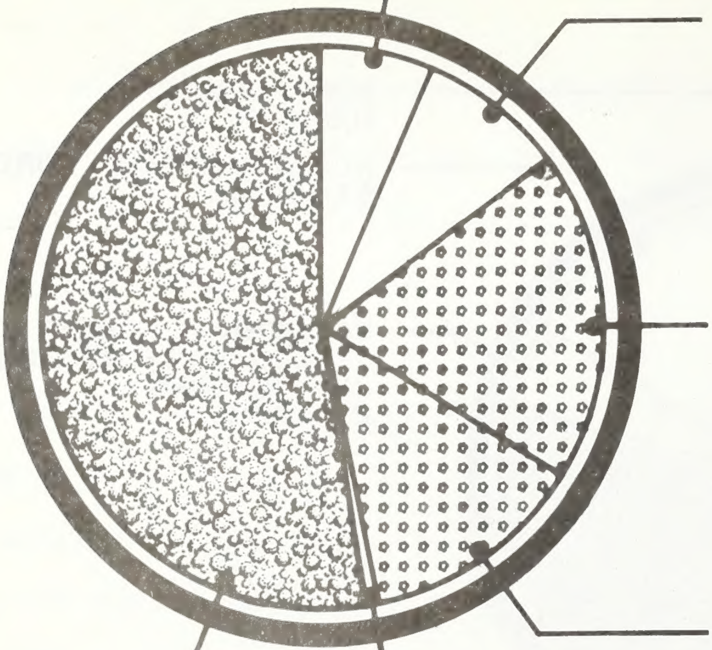


Figure 1-6 ACREAGE DISTRIBUTION IN THE 1977 PROPOSED ALLOWABLE HARVEST COMPUTATION

INVENTORY DATA:

- Total Inventory Volume—5,202,000 MBF Scribner Equivalent (23 MBF/Acre)
- Average Annual Yield Per Acre (high intensity)—417 BF Scribner Equivalent
- Total Area of SYU—425,720 Acres
- Average Site Index—115
- Stand Density Index—73 Per cent

ASSUMPTIONS:

- Regeneration Period—4 Years
- Ist Decade Intensive Management Practices:
  - Pre-commercial Thinning—14,200 Acres
  - Commercial Thinning—4,700 Acres
  - Fertilization—18,900 Acres
- Ultimate Per-cent of Total Acreage to Undergo Pre-commercial and Commercial Thinning—74 Per cent
- Ultimate Per cent of Total Acreage to Undergo Fertilization—74 Per cent

SOURCE: BLM, 1977

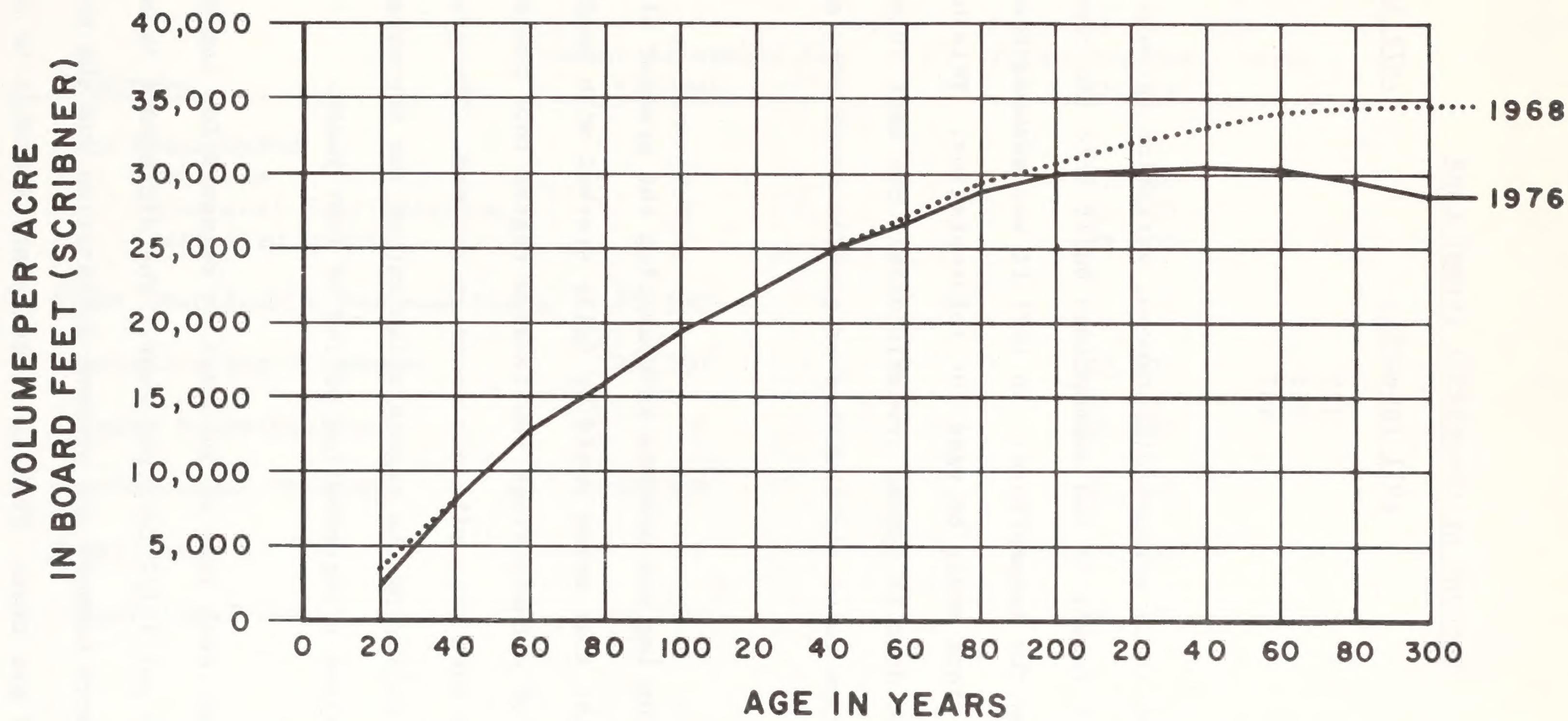


Figure 1-7 EMPIRIC YIELD CURVES • HIGH INTENSITY LANDS
SOURCE: BLM Forest Inventory • 1968 & 1976

Percent of Commercial Forest Land

Age Class	1971 Inventory	1977 Inventory
0 - 90	32%	31%
100 - 190	22%	23%
200+	46%	46%

In addition to basic acreage differences, variation between the two allowable cuts is a factor of the assumptions built into the computations. Table 1-14 compares the assumptions. In 1971 it was assumed that genetically superior planting stock would be used for reforestation. This has not proven to be the case, nor does it appear probable within the next 20 years. Therefore, wood production gains attributable to genetic stock were not included in the proposal.

No regeneration lag was assumed in computing the present allowable cut. It was thought that areas would be fully stocked with seedlings when final harvest cut of a three-stage shelterwood regime took place. Present evidence indicates that this will not occur as assumed. The proposal calls for underplanting following the regeneration cut of the two-stage shelterwood program and recognizes a regeneration period of four years.

On the average, each year of increase in regeneration lag reduces computed allowable cut 1 1/2 to 2 per cent. The difference in average annual yield per acre between the present declaration and the proposal is approximately 7 per cent. This is directly attributable to the four-year regeneration lag assumed in the proposal.

Table 1 - 14

Total of Intensive Management Practices Assumed in Computation of the Present Harvest Volume and the Proposal - Total of Treatments for Eight Decades

Treatment	Present Allowable Cut (Acres)	Proposal for High Intensity Mgmt. Lands (Acres)
1. Site Preparation		
a. Herbicide	0	147,300
b. Mechanical Scarification	0	12,500
c. Controlled Burning	0	39,000
2. Plant Genetically Improved Stock	80,300[1]	0
3. Plantation Establishment	80,300[1]	222,900
4. Release by Herbicides	0	187,000
5. Precommercial Thinning	164,000[2]	165,300
6. Fertilization	0	165,300
7. Commercial Thinning	164,000[2]	165,300

1 All projected planting with genetically improved stock.

2 Projects 49% of area would be thinned, beginning in 4th decade.

It would appear that increased application of intensive management practices (see Tables 1-1 and 1-14) should offset the downward effect of increased regeneration lag. However, an insufficiency of growing stock (see Table 1-6 and Figure 1-4) makes it impossible to capture the full allowable cut effect (ACE) potentially available as a result of the indicated practices.

In summary, the present allowable cut is 146 million board feet compared to a proposal for 94 million board feet, Scribner equivalent, from high intensity land. The major factor in the difference is a 33 per cent smaller area allocated to high intensity timber management.

It should be reiterated that an additional 2.28 million cubic feet (12 million board feet Scribner) is contained in the proposed ten-year timber management plan. This volume, however, is not part of the allowable cut--merely trial harvest in the first decade. It therefore cannot enter into the comparison.

2. DESCRIPTION OF THE ENVIRONMENT

In preparation of this chapter the primary data source is documents of the Bureau planning system for the Josephine Planning Area. Unit Resource Analysis documents for Grants Pass, Galice, and Glendale Planning Units and the Planning Area Analysis and Management Framework Plan for Josephine Planning Area are available for review at Medford District Office, 310 West 6th Avenue, Medford, Oregon, 97501.

Other references supplementary to or updating planning system data are cited within the body of the text by author and date of publication. a listing of these references appears as Appendix L.

2.1 EXISTING ENVIRONMENT

The following sections address the environment as it exists today within the Josephine Sustained Yield Unit (JSYU, SYU). Since intensive timber management has been practiced within the SYU for several decades, the environment described is seldom natural or pristine but exhibits the actions of man.

As with any environmental statement, this section is critical as a basis on which impacts of the proposed action may be assessed. In preparation of Chapter 2 the team was cognizant of the proposed action and addressed those elements of the environment which might be affected.

Peripheral environmental data are included only to the extent necessary to provide the basic picture.

2.1.1 Physical Environment

Physical environment as used here refers to the non-living or inorganic elements of the environment. The following subsections address typical categories of physical environment using the standard measurement devices of each.

2.1.1.1 Climate

Climate Classification

The climate of the Josephine unit is a transitional one between the Mediterranean climate to the south and the marine-mesothermal climate to the north. Figure 2-1 illustrates a typical Mediterranean climate (Sacramento, California), a station within the boundaries of the SYU (Grants Pass, Oregon), and a marine-mesothermal climate (Portland, Oregon) (Trewartha, 1954). The transitional nature of the climate zone surrounding the SYU is important in understanding the patterns of vegetation and soils in the region. Exact differentiation as to climate type cannot be done due to altitude differences and proximity to the Pacific Ocean.

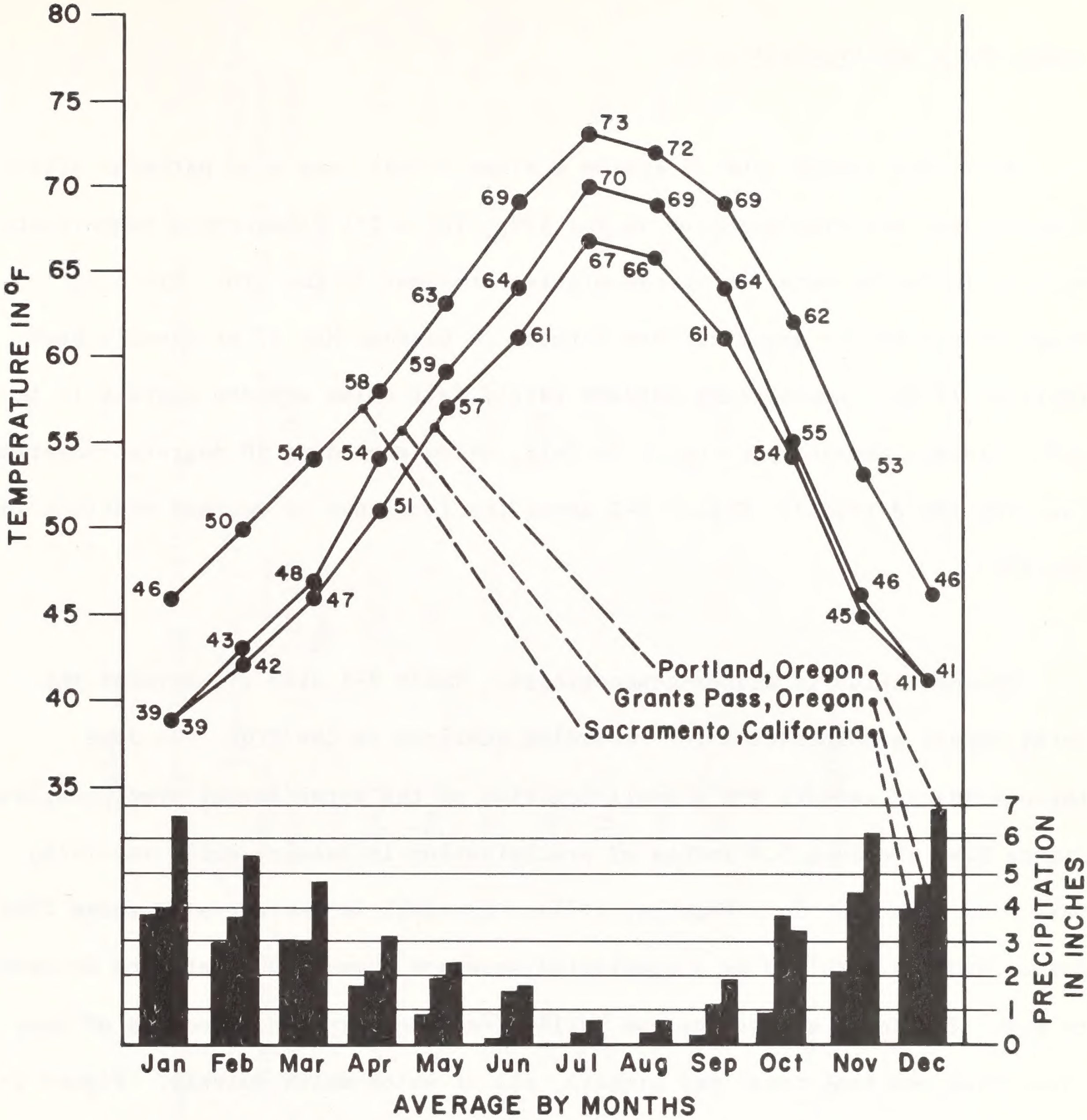


Figure 2-1 CLIMATE OF JSYU COMPARED
SOURCE: Trewartha, 1954 & Johnsgard, 1963

Temperature and Precipitation

Altitude, aspect (the direction a slope faces), and wind patterns affect temperatures and precipitation in the SYU. Table 2-1 illustrates temperature and precipitation data for representative stations in the SYU. Freezing temperatures may be expected from October 16 through May 17 at Grant's Pass (Ruttle, 1973). Lowest temperatures rarely fall below sixteen degrees in the SYU. Maximum temperatures occur in July, often exceeding 90 degrees (sometimes reaching 100 degrees). Figure 2-2 shows the locations of weather stations in the SYU.

Precipitation is winter-concentrated. Table 2-1 also illustrates the total annual precipitation for recording stations in the SYU. The June through August amounts are a small fraction of the total annual precipitation. Grants Pass receives 5.8 inches of precipitation in January while receiving only 0.25 inches in July (Ruttle, 1973). Snowfall is concentrated above 2500 feet. Snow is retained as a cumulative snowpack above 3000 feet from December to May. The lower elevations and valleys receive only minor amounts of snow (less than one foot total per winter), all of which melts quickly. Figure 2-3 illustrates mean annual precipitation over the SYU and vicinity.

Measurements of precipitation may vary by 18 to 40 percent on rain guages no more than a few feet apart. Two identical rain guages 10 feet apart on a wind ridgetop can differ consistently in catch by 50 per cent of the smaller (Court, 1960 and Glander, 1966 in Anderson, 1976).

TABLE 2-1

Temperatures and Precipitation for Selected Stations in the Josephine SYU

		Temperatures (^{o}F)					Precipitation (in.)	
Station	Elevation	Average Annual	Average January	Average January Minimum	Average July	Average July Maximum	Average Annual	June thru August
Sexton Summit	3,836	48.0	34.1	30.0	63.6	76.4	33.1	2.1
Grants Pass	925	53.8	39.0	31.5	70.2	90.1	30.2	1.2
Williams	1,370	52.0	38.6	29.7	67.0	86.6	32.3	0.3
Cave Junction	1,280	53.3	38.9	--	69.6	--	79.4	0.3
Waldo Station	1,650	50.6	36.6	28.3	67.3	88.0	52.1	1.2
Wolf Creek	1,274	52.9	38.6	31.4	67.8	87.5	40.9	1.5
Glendale	1,390	52.7	39.5	31.8	68.1	88.1	37.7	1.5

Source: Galice, Glendale and Grants Pass URAs
File data from US Weather Service, Medford

Figure 2-2 **LOCATIONS OF WEATHER STATIONS**
SOURCE: Galice & Grants Pass URA

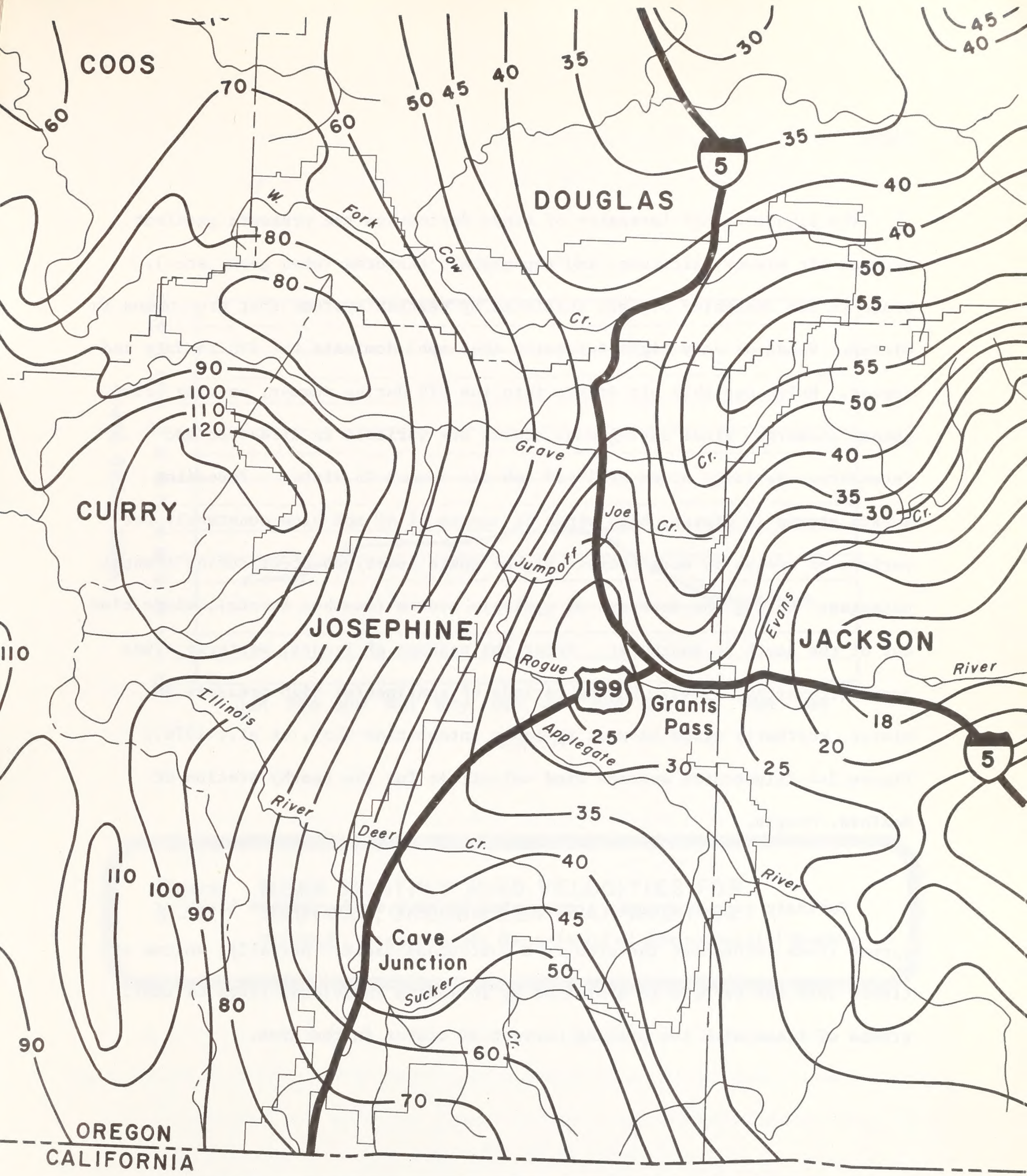


Figure 2-3 MEAN ANNUAL PRECIPITATION • WESTERN OREGON IN INCHES
SOURCE: Pacific Northwest River Basins Commission, 1970

Winds

The direction and intensity of winds depends on the pressure gradient between air masses, altitude, and topographic features (wind gaps, etc.). Winds in the Josephine SYU are initiated by weather systems that are common in winter. Winds of very light intensity (0-5 mph) dominate the SYU in July and August. Moist unstable air drifts into the SYU during summer, causing brief thundershowers. Winds during such storms are variable in direction and intensity. Westerly winds of 10-30 mph are common in winter. Preceding severe storms in winter, high winds in excess of 40 mph blow constantly for periods of twelve or more hours. Higher gusts sometimes occur during frontal passages. During the approach of cyclonic storms (weather fronts), winds blow out of the south to southwest. After the passage of fronts, westerly winds occur (Trewartha, 1954). During periods of continental high pressure in winter, northerly winds blow at variable intensities (Loy, et al., 1976). Figure 2-4 illustrates average wind velocities for the nearby station of Medford, Oregon.

Periodic winter storms, accompanied by high winds, either break or uproot trees throughout the area on a continuous basis. Normally, volume of timber loss can be held to a minimum by including individual trees or small groups of trees with the planned harvest of timber in the area.

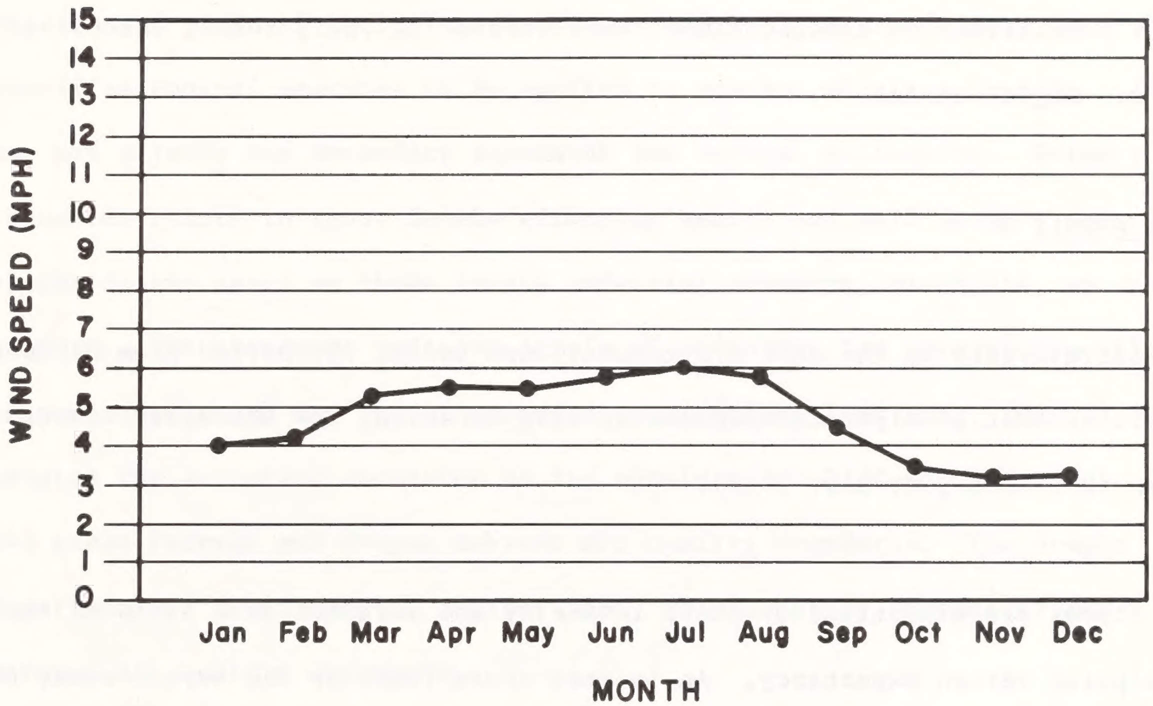


Figure 2 - 4 MEAN MONTHLY WIND VELOCITIES FOR MEDFORD, OREGON (26 YEAR AVERAGE)
SOURCE: Oregon State Department of Environmental Quality

Occasionally however, extremely high winds, such as those created in the Columbus Day storm of 1962, can cause an abnormal blowdown situation which could completely disrupt the timber management program for a period of several years. Prompt salvage is necessary to avoid buildup of destructive insect populations in damaged timber (see Section 2.1.2.2, Forest Insects of Economic Significance.)

Storm Events

Storm events in the JSYU are concentrated during the period from October to April. Most precipitation is due to long duration, low intensity winter storms (Rothacher, et al., 1968).

Storms are classified by their intensity and duration on a basis of their anticipated return expectancy. An intense storm (such as the severe event of December, 1964) would have an expected return frequency of 50 to 100 years. Average storms would have an expected frequency of two years (Ibid.).

2.1.1.2 Air Quality

The following discussion is paraphrased from "Oregon Air Quality Annual Report 1975" and "Air Quality Profile and Evaluation for Southwest Oregon Intrastate Air Quality Control Region" released in 1976 by the Oregon Department of Environmental Quality.

Authority

The U.S. Clean Air Act Amendments of 1970 require each state to submit to the Environmental Protection Agency (EPA) a State Implementation Plan (SIP) detailing a proposal to implement ambient air quality standards. Oregon's SIP specifies control measures to be applied to sources of air pollution. The EPA has set primary and secondary standards for several pollutants. Primary standards relate to those levels effecting health and well being. Secondary standards are based on those levels effecting property, materials, and personal comfort. The standards indicate levels of pollution for several specific contaminants which may not be exceeded in a geographical area. Oregon has adopted the secondary standards as its absolute level of contaminants. Table 2-2 gives Federal and Oregon Ambient Air Quality Standards. The Oregon Department of Environmental Quality (DEQ) has authority to monitor and enforce air quality standards.

Oregon has been divided into five Federal Air Quality Control Regions (AQCRs) on the basis of pollution concentrations, geography, and economics. The Josephine SYU lies in the Southwest Oregon AQCR (Figure 2-5). The EPA has required the states to identify those areas which, due to current ambient air quality and/or projected growth rate, may exceed national air quality standards within 10 years after June, 1975. These Air Quality Maintenance Areas (AQMA) are undergoing thorough analysis. A control strategy for maintaining standards will be developed for each AQMA after analysis. Computer simulation models have been developed for augmenting control strategies. From model estimates

Table 2-2

State of Oregon
Department of Environmental Quality
Air Quality Control Division
Ambient Air Standards

Contaminant	Federal Standards Primary	Federal Standards Secondary	State of Oregon Standards
Carbon-Monoxide	(1) 10 mg/M^3* max. 8-hr average [a]	Same as primary	(1) 10 mg/M^3 max. 8-hr average[a]
	(2) 40 mg/M^3 max. 1-hr average [a]	Same as primary	(2) 40 mg/M^3 max. 1-hr average[a]
Sulfur-Dioxide	(1) 80 ug/M^3** annual arithmetic mean		(1) 60 ug/M^3 annual arithmetic mean[b]
	(2) 365 ug/M^3 max. 24-hr concentration[a]	1300 ug/M^3 max. 3-hr average	(2) 260 ug/M^3 max. 24-hr average [a,b]
			(3) 1300 ug/M^3 max. 3-hr average[a]
Photochemical Oxidant	160 ug/M^3 max. 1-hr average [a]	Same as primary	160 ug/M^3 max. 1-hr average[a]
Nitrogen-Dioxide	100 ug/M^3 annual arithmetic mean	Same as primary	100 ug/M^3 annual arithmetic mean
Reactive Hydrocarbons	160 ug/M^3 max. 3-hr average 0600-0900[a]	Same as primary	160 ug/M^3 max. 3-hr avg. 0600-0900[a]
Suspended Particulate	(1) 75 ug/M^3 annual geometric mean	(1) 60 ug/M^3 annual geometric mean as a guide	(1) 60 ug/M^3 annual geometric mean
	(2) 260 ug/M^3 max. 24-hr concentration[a]	(2) 150 ug/M^3 max. 24-hr concentration[a]	(2) 100 ug/M^3 24-hr concentration more than 15% of time[c]
			(3) 150 ug/M^3 maximum 24-hr concentration[a]
Particle Fallout	None	None	(1) 10 gms/M^2/month in an industrial area
			(2) 5.0 gms/M^2/month in an industrial area if presence of soot or woodwaste and volatile fraction exceeds 70%
			(3) 5/9 gms/M^2/month in a residential or commercial area or 3.5 gms/M^2 /month if soot, woodwaste are present or volatile portion exceeds 70%
Calcium Oxide As Suspended Partilate	None	None	(1) shall not exceed 20 ug/M^3 in residential or commercial areas at any time
Calcium Oxide as Particle Fallout	None	None	(2) shall not exceed 0.35 gms/M month at any station
Lead	None	None	Shall not exceed 3.0 ug/M^3 monthly average at any station

*Milligram per cubic meter
** Microgram per cubic meter
a = "not to be exceeded more than once per year."
b = "Federal Regulations on this standard revoked September 14, 1973."
c = "For samples collected during a calendar month."

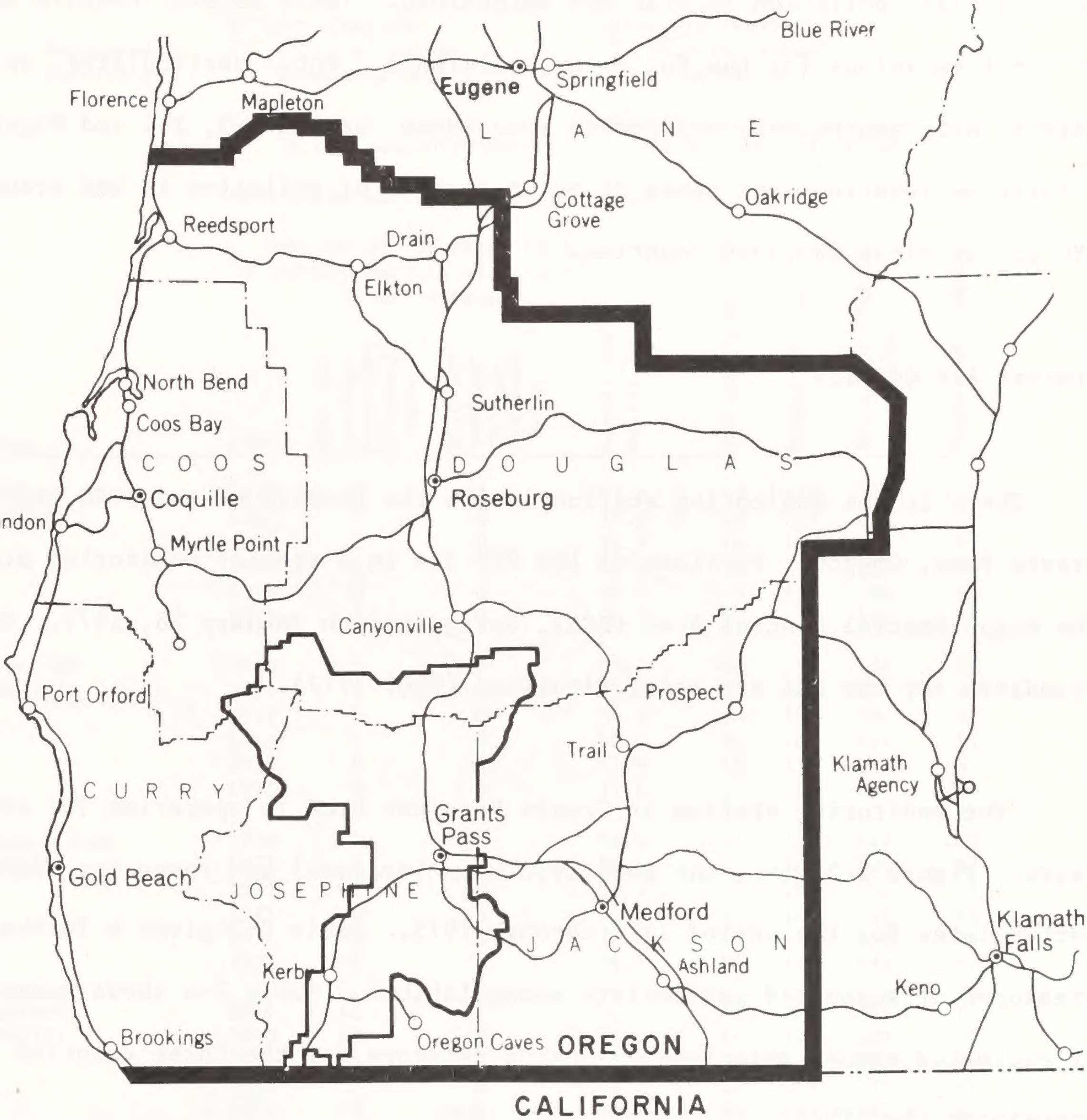


Figure 2-5 SOUTHWEST OREGON INTRASTATE AIR QUALITY CONTROL REGION
SOURCE: DEQ, 1976

of downwind pollutant concentrations, impact evaluations and control measures may be determined. An Emissions Inventory (EI) lists all sources in Oregon for which air pollution records are maintained. These records contain estimates of total emissions for the following pollutants: total particulates, sulfur oxides, nitrogen oxides, and carbon monoxides. Tables 2-3, 2-4 and Figure 2-6 illustrate locations and names of point sources of pollution in and around the SYU in the three involved counties.

Present Air Quality

There is one monitoring station inside the borders of the JYSU, at Grants Pass, Oregon. Portions of the SYU lie in a special monitoring area, the Rogue Special Control Area (SCA), designated on January 28, 1977. The standards for the SCA are being finalized (DEQ, 1977).

The monitoring station at Grants Pass has been in operation for seven years. Figure 2-7 gives the geometric mean (average) and range for suspended particulates for the period 1970 through 1975. Table 2-3 gives a further breakdown of suspended particulate accumulations. Table 2-4 shows summaries of estimated annual emissions by source category for the three counties containing the SYU.

The Oregon standards for total particulates were exceeded during two separate 24-hour periods in 1975. Microscopic examination of the particulate samples on the two 24-hour periods revealed 75-85 per cent to be quartz and

Table 2-3

Ambient Air Sampling Data, Suspended Particulate

Note: Available data was evaluated with respect to the National Ambient Air Quality Standards listed below:

Contaminant	Federal Standards	
	Primary (Health)	Secondary (Welfare)
Suspended Particulate	(1) 75 ug/m^3 annual geometric mean	(1) 60 ug/m^3 annual geometric mean
	(2) 260 ug/m^3 maximum 24 hr. concentration*	(2) 150 ug/m^3 maximum 24 hr. concentration*

*Not to be exceeded more than once/year

Ambient Air Sampling Data
Suspended Particulate, ug/m^3
(24 hr. sample)

Site	Year	Days Exceeding Secondary Standard Value	Days Exceeding Primary Standard Value	Annual Geometric Value	Minimum Value	Maximum Value	Secondary Highest Value	Number of Samples
Ashland 1502105	1970	0	0	47.2	13	118	104	107
	1971	3	0	37.0	20	237	215	110
	1972	0	0	53.7	16	125	114	87
	1973	0	0	48.3	18	127	117	51
	1974	0	0	49.5	8	105	86	44
	1975	1	0	50.7	17	170	123	58
Coos Bay 0607101	1970	1	0	51.7	16	152	129	89
	1971	1	0	53.6	14	185	137	49
	1972	0	0	44.9	16	108	101	81
	1973	1	0	50.1	21	164	123	56
	1974	0	0	47.9	15	127	111	52
	1975	0	0	37.1	13	95	93	59
Grants Pass 1707105	1970	4	0	58.0	13	249	247	103
	1971	3	0	59.1	19	246	204	87
	1972	1	0	61.3	24	197	141	75
	1973	0	0	53.8	22	140	139	41
	1974	0	0	48.4	15	145	123	46
	1975	2	0	56.8	22	179	173	47
Medford 1520117	1969	11	1	--	32	301	235	75
	1970	13	1	76.6	16	298	208	170
	1971	5	0	78.9	21	226	222	84
	1972	7	0	83.4	23	207	192	91
	1973	3	0	69.9	33	183	162	56
	1974	5	1	75.9	23	301	223	58
	1975	7	0	71.7	22	228	214	66
Roseburg 1027017	1970	3	0	50.6	15	231	223	106
	1971	2	0	51.2	17	185	180	98
	1972	2	0	59.3	21	222	162	88
	1973	4	0	52.9	16	233	181	58
	1974	4	1	64.7	16	263	258	57
	1975	0	0	43.9	21	93	89	52

(Source: DEQ 1976)

Table 2-4

SUMMARY OF ESTIMATED ANNUAL EMISSIONS (TONS/YEAR) BY SOURCE CATEGORY

*** SOUTHWEST OREGON INTRASTATE AIR QUALITY CONTROL REGION ***

TOTAL PARTICULATES

SOURCE CATEGORY	TONS/YEAR
A. FUEL COMBUSTION SOURCES:	
1. RESIDENTIAL FUEL COMBUSTION	116
2. COMMERCIAL FUEL COMBUSTION	164
3. INDUSTRIAL FUEL COMBUSTION	8,507
TOTAL FUEL COMBUSTION	8,789
B. PROCESS LOSS SOURCES:	
1. CHEMICAL INDUSTRIES	8
2. FOOD/AGRICULTURE INDUSTRIES	84
3. METALLURGICAL INDUSTRIES	927
4. MINERAL PRODUCTS INDUSTRIES	168
5. PETROCHEMICAL INDUSTRIES	0
6. WOOD PROCESSING INDUSTRIES	5,562
7. OTHER INDUSTRIES	0
TOTAL PROCESS LOSS	6,752
C. TRANSPORTATION SOURCES:	
1. MOTOR VEHICLES	1,877
2. OFF-HIGHWAY FUEL USE	121
TOTAL TRANSPORTAION	1,998
D. SOLID WASTE SOURCES:	
1. INCINERATION	11
2. OPEN BURNING	120
3. WIGWAM WASTE BURNERS	900
TOTAL SOLID WASTE	1,033
E. MISCELLANEOUS AREA SOURCES:	
1. FIELD BURNING	4
2. FOREST FIRES	2,375
3. SLASH BURNING	6,585
4. OTHER	305
TOTAL MISCELLANEOUS	9,269
SUMMARY BY SOURCE CLASS:	
1. AREA SOURCES	11,556
2. POINT SOURCES	16,286
TOTAL OF ALL SOURCES	27,842

(Source: DEQ)

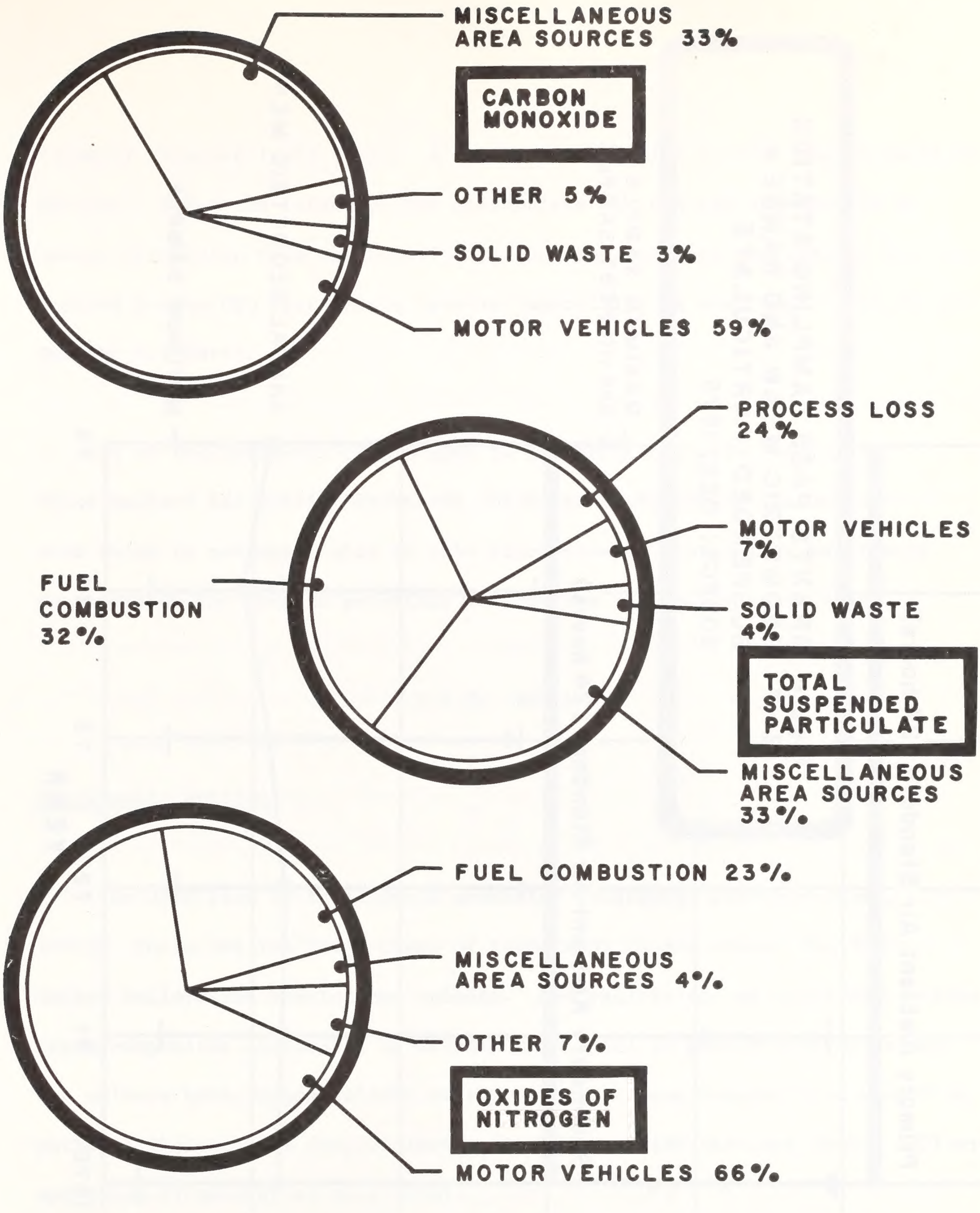


Figure 2-6 PERCENTAGE OF EMISSIONS FROM MAJOR SOURCES
SOURCE: DEQ, 1976

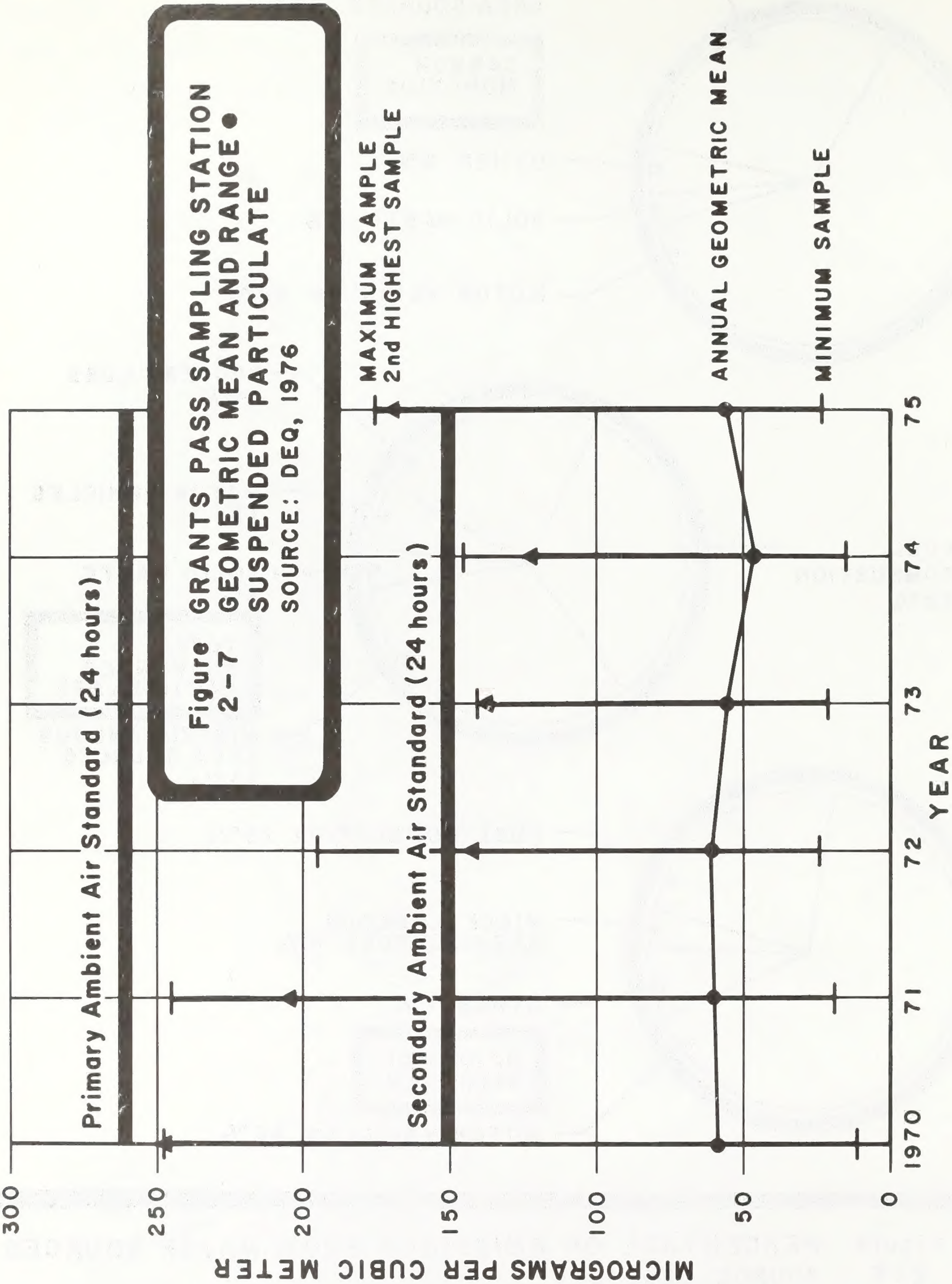


Figure 2-7 GRANTS PASS SAMPLING STATION GEOMETRIC MEAN AND RANGE ● SUSPENDED PARTICULATE
SOURCE: DEQ, 1976

feldspar crystals (soil dust). A nearby construction project contaminated the monitor. Since the intent of the particulate air quality standard is to insure protection from the effects of recurring emission sources, it has been decided by the DEQ that Grants Pass is essentially in compliance with the Air Quality Standards.

All of the Southwest Oregon AQMA is in compliance with Federal and State Ambient Air Quality Standards (with the exception of the Medford area which is not applicable to this discussion). Air quality is closely monitored in the area as potential for serious air pollution is high.

2.1.1.3. Soils

Topographic Setting

The JSYU lies in the Klamath mountains geographic province (Hunt, 1974). There are two basic types of topography in and around the JSYU: inland valleys and mountainous uplands. The valleys are alluvial depositions (water-deposited sediments) of streams with level to gently sloping relief. The uplands have rugged relief; streams have cut deep canyons in a branching pattern, indicating a deeply dissected, old peneplain that was eroded following uplifting (Franklin, et al., 1974).

Parent Material

The geology of the Klamath mountains province is as complex as any area of the Pacific Northwest. Very old (paleozoic and early mesozoic eugeosynclinal deposits) rocks have been greatly deformed and metamorphosed (altered in mineral structure by heat and/or pressure). The old rocks have been faulted and intruded by granitic and ultrabasic igneous rocks. Folding and faulting have increased the complexity of the area even further (McKee, 1972).

Two types of rock present have weathered to soils which have caused problems in the timber management program. The granitic rocks weather to soils which contain a subsoil of single grain structure and coarse texture (commonly called grus by soil scientists). This subsoil material is very unstable on steep slopes; it is very prone to slumpage and landslides, especially when wet. The ultrabasic rocks (dunite and peridotite) have been altered by heat and pressure to serpentine, an intrusive rock that has been squeezed into fault zones. Soils formed on serpentine have high clay content, shallow profiles, and restricted vegetation due to magnesium toxicity. The shallow profiles and high clay content make these soils droughty; the magnesium toxicity (and the droughtiness) make serpentine soils unproductive. The TPCC process has eliminated virtually all the steeply sloped granitic soils and the serpentine soils from the high intensity lands of the proposed action (see Chapter 1).

amount as 24 tons per square mile per year. Similar studies on slopes of 55 per cent with parent materials of tuffs and breccias found measures of 14 tons per square mile per year (Rice, 1977). Granitic soils in Idaho on 30 per cent slopes had an observed measure of eroded material of nine tons per square mile per year (Ibid). The overall erosion rate of undisturbed lands in the JSYU is estimated to be 45 tons per square mile per year. The present rate of erosion for all lands in the JSYU (undisturbed, disturbed, industrial, urban, and all others) is estimated to be 200 tons per square mile per year. This compares to an average annual erosion rate of from 77 to 232 tons per acre per year for the continental United States (Hunt, 1974).

2.1.1.4 Water Resources

Watershed Relationships

The water resources of the JSYU lie within two major watersheds of southwest Oregon: the Rogue River watershed contains 79.8 per cent of the area while the Cow Creek watershed (part of the South Umpqua River watershed) contains 20.2 per cent.

A short discussion of the relationship of water to the forest ecosystem is presented here; the movement of water within the forest is not readily apparent to the average person.

Precipitation entering a forest ecosystem becomes part of the forest hydrologic cycle. Some precipitation is intercepted by the vegetation; some of the intercepted water evaporates, decreasing in proportion to increasing ambient relative humidity. The proportion of precipitation lost through evaporation depends on the intensity and duration of the storm event. A higher proportion of precipitation from larger storms reaches the ground in a forest ecosystem (Harr, 1976).

The precipitation reaching the soil surface infiltrates the soil profile through the duff layer (the surface layer of needles and partially decomposed organic debris). Infiltration capacities (the rate at which water enters the soil) of soils in western Oregon often exceed 150 cm/hr. (59 inches per hour) (Dyrness, 1969; Ranken, 1974; Yee, 1975 in Harr, 1976). Overland flow in undisturbed forest ecosystems is nonexistent due to the extremely high infiltration rates. Subsurface water movement accounts for nearly all runoff in western Oregon (Harr, 1976).

Water in the soil is subject to uptake and transpiration (evaporation of water through leaves) by forest vegetation and to evaporation from the soil surface. In an undisturbed forest, evaporation is very slow due to the low amount of heat energy available for evaporation, the high relative humidity and the low air movement near the ground. Transpiration is responsible for removal of 15 to 30 per cent of water from the forest environment. Water not returned to the atmosphere by evaporation or transpiration either moves downslope, maintaining streamflow, or percolates to ground water.

Percolation of the underlying rocks of the JSYU is very slow or nonexistent due to low porosities; little recharge occurs (Columbia-North Pacific Region Comprehensive Framework Study). Since little water is held in rocks as ground water, runoff occurs mostly from soil water. Since the soil profiles can retain only a fraction of the total precipitation, stream flow strongly reflects the seasonal nature of precipitation.

Appendix E illustrates the mean monthly discharges and annual discharges of the major streams in and around the JSYU. In observing these graphs, two features should be noted. The amount of monthly runoff is strongly reflective of the precipitation amounts; also, the annual discharges of the streams are extremely variable. The variability is due to fluxuations in snow pack depth, precipitation means, precipitation duration, and temperatures.

Water Quality

Water quality refers to the combined physical, chemical, and biological characteristics of the stream draining the Josephine SYU. Individual chemical and biological substances present are termed constituents. Quality characteristics imparted to water by the constituents present are termed properties (Chow, 1964). Water quality descriptions involve analysis of water samples for constituents and measurement of properties. Water descriptions are by water year: measurements taken from October to September are numbered as to year by January's year.

Descriptions of water quality are given in an array of data in a table format. Individual constituents and properties are portrayed alongside each other, the whole making up the complete description of the sample. Tables 2-5 through 2-8 describe constituents and properties of the Rogue River and the Umpqua River. The tables have been developed from data determined and compiled by the United States Geological Survey from stations at Agness (on the Rogue River) and at Roseburg (on the Umpqua River). These tables provide a comprehensive overview of the water quality in the Josephine SYU and vicinity.

Present water quality in the Josephine SYU generally meets established water quality standards (DEQ, 1976). Table 2-9 describes constituents and properties of streams inside the boundaries of the Josephine SYU. This data was sifted from agencies conducting water quality monitoring in the SYU vicinity. Figure 2-9 illustrates the locations of major perennial streams inside the boundaries of the SYU.

Water quality criteria for the State of Oregon appears as Appendix G; this represents Oregon's "non-degradation clause" with respect to waters of the State. All states are required by Public Law 92-500 - the Federal Water Pollution Control Amendments of 1972 - to prepare and implement Water Quality Management Plans for all drawable basins. Oregon law - ORS Chapter 408 - directs the compilation and implementation of Water Quality Management Plans.

Table 2-5
Chemical Quality of Rogue River near Agness, Oregon for Water Year October, 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	SiO_2 (mg/l) (silica)	Ca^{++} (mg/l) (calcium)	Mg^{++} (mg/l) (magnesium)	Na^+ (mg/l) (sodium)	K^+ (mg/l) (Potassium)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^=$ (mg/l) (carbonate)	$SO_4^=$ (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	Total Dissolved Solids (sum) (mg/l)	Total Dissolved Solids (tons/day)	Total Dissolved Solids (tons/acre foot)	Ca+Mg Hardness (Mg/l)
10/22	1400	29	11	3.1	5.2	1.5	59	--	3.1	3.1	0.1	--	--	0.08	--	86	325	0.12	40
11/18	2090	25	11	4.3	5.5	1.6	62	--	4.5	5.8	0.0	0.06	0.65	0.09	102	88	576	0.14	45
12/19	4400	23	9.7	3.8	4.9	0.9	51	--	3.2	3.1	0.0	0.12	0.27	0.13	83	74	986	0.11	40
1/28	7400	21	9.7	3.7	2.2	1.1	46	--	2.9	3.4	0.1	0.13	0.31	0.07	83	67	1660	0.11	39
2/19	15900	15	8.6	4.0	3.9	0.8	44	--	2.8	1.9	0.0	0.15	4.2	0.16	59	59	2530	0.08	38
3/19	90900	14	8.8	3.3	15	1.3	42	0	4.0	5.7	0.3	0.02	1.4	1.1	118	73	29000	0.16	36
4/23	7680	20	12	3.7	4.4	1.1	56	0	2.5	1.8	0.1	0.08	0.14	0.06	67	74	1390	0.09	45
5/22	7850	18	7.4	2.9	7.9	0.9	43	0	2.4	1.5	0.1	0.04	0.06	0.05	55	62	1170	0.07	30
6/18	5380	19	8.1	2.3	3.5	0.9	38	0	3.0	0.8	0.0	0.01	0.68	0.05	57	56	828	0.08	30
7/23	1910	25	9.5	3.4	4.9	1.3	49	0	4.8	1.8	0.1	0.01	0.17	0.08	74	75	382	0.10	38
8/20	2020	26	9.6	3.3	5.6	1.4	55	0	2.3	2.3	0.1	0.10	0.26	0.13	75	78	409	0.10	38
9/24	1550	26	11	0.8	6.4	1.5	56	0	2.3	2.5	0.1	0.03	0.54	0.10	76	78	318	0.10	31

N = nitrogen
P = phosphorous

(Source: USGS, 1976)

Table 2-6
Water Quality Data For Rogue River near Agness, Oregon Water Year 10-74 to 9-75

Date	Specific Conductance (micro-mhos)	pH	Turbidity (JTU)	Suspended Sediment (mg/l)	Suspended Sediment Tons/day	Temperature °C	Temperature °F	Fecal Coliform Col/100ml	Streptococci Colonies per 100 ml	Total Organic Carbon (mg/l)	Phytoplankton cells/ml
10/22	122	7.5	---	4	15	11.5	52.7	8	--	--	--
11/18	119	7.2	1	38	214	9.0	48.2	70	48	--	1400
12/19	111	7.1	7	9	107	7.0	44.6	--	22	--	890
1/28	105	6.6	10	22	440	4.5	40.1	40	20	2.8	340
2/19	90	7.2	60	31	1330	5.5	41.9	42	1.75	--	120
3/19	160	7.1	400	2600	638000	6.0	42.8	1160	1400	--	650
4/23	173	7.3	5	22	456	10.5	50.9	4	10	5.7	1100
5/22	99	7.3	7	67	1420	12.5	54.5	13	7	--	530
6/18	69	7.3	3	30	436	16.0	60.8	14	22	--	1500
7/23	93	7.5	2	8	41	22.0	71.6	4	2	3.2	3700
8/20	99	7.4	3	12	65	18.0	64.4	8	100	--	3200
9/24	112	7.7	1	6	25	17.5	63.5	3	4	--	1900

(Source: USGS, 1976)

Table 2- 7

Chemical Quality of Umpqua River near Roseburg, Oregon for Water Year October 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	SiO_2 (mg/l) (Silica)	Ca++ (mg/l) (calcium)	Mg++ (mg/l) (magnesium)	Na+ (mg/l) (sodium)	K+ (mg/l) (Potassium)	HCO_3^- (mg/l) (bicarbonate)	CO_3^- (mg/l) (carbonate)	SO_4^- (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	(sum) (mg/l)	(tons/ day)	(tons/ acre foot)	Ca+Mg Hardness (mg/l)
10/23	80	--	21	11	--	--	89	--	--	--	--	1.3	1.8	0.52	151	--	32.6	0.21	98
11/19	2400	--	17	3.9	--	--	73	--	--	--	--	0.22	1.0	0.21	130	--	778	0.16	59
12/20	7000	--	11	3.0	--	--	40	--	--	--	--	0.12	0.26	0.08	109	--	2060	0.15	40
1/29	4300	17	10	3.1	3.7	1.0	40	--	3.3	2.5	0.0	0.23	0.34	0.04	75	62	871	0.10	38
2/20	28000	12	6.1	2.8	6.4	0.9	31	--	2.9	3.1	0.0	0.06	0.53	0.22	--	50	3780	0.07	27
3/18	12200	--	7.8	3.7	--	--	44	0	--	--	--	0.05	0.31	0.12	76	--	2500	0.10	35
4/22	3270	--	9.0	3.6	--	--	45	0	--	--	--	2.3	2.3	0.05	62	--	547	0.08	37
5/21	2320	--	40	2.8	--	--	37	0	--	--	--	0.02	0.12	0.03	53	--	332	0.07	110
6/17	820	--	8.8	2.9	--	--	36	0	--	--	--	0.00	1.1	0.06	58	--	128	0.08	34
7/22	570	--	15	5.2	--	--	56	0	--	--	--	0.07	0.50	0.17	88	--	135	0.12	59
8/19	383	--	15	6.7	--	--	70	0	--	--	--	0.19	0.84	0.30	99	--	102	0.13	65
9/23	244	9.3	15	6.7	11	1.5	69	0	8.4	13	0.1	0.20	0.90	0.38	100	--	65.9	0.14	65

N = nitrogen
P + phosphorous

(Source: USGS, 1976)

Table 2-8

Water Quality Data For Umpqua River near Roseburg, Oregon - Water year 1975

Date	Specific Conductance (Micro-mhos)	pH	Turbidity (JTU)	Temperature ^{o}C	Temperature ^{o}F	Fecal Coliform col/100ml	Streptococci Colonies per/100ml	Dissolved Oxygen (mg/l)
10/23	225	7.3	7	13.0	55.4	1660	72	6.9
11/19	195	7.1	10	10.0	50.0	58200	1020	11.3
12/20	92	7.0	30	8.5	47.3	150	35	10.9
1/29	90	6.7	15	4.5	40.1	40	1	13.2
2/20	75	7.2	20	7.0	44.6	320	100	12.0
3/18	88	7.2	85	8.5	47.3	3100	2820	11.2
4/22	93	7.2	6	11.0	51.8	20	5	11.3
5/21	70	7.3	3	13.5	56.3	20	27	9.7
6/17	81	7.3	2	19.0	66.2	54	18	9.4
7/22	130	7.8	1	25.5	77.9	120	5	8.4
8/19	165	7.6	2	21.0	69.8	3060	80	7.8
9/23	185	7.7	2	20.0	68.0	2080	6	-

(Source: USGS, 1976)

Table 2-7
Chemical Quality of Umpqua River near Roseburg, Oregon for Water Year October 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	SiO_2 (mg/l) (Silica)	Ca^{++} (mg/l) (calcium)	Mg^{++} (mg/l) (magnesium)	Na^+ (mg/l) (sodium)	K^+ (mg/l) (Potassium)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^{=}$ (mg/l) (carbonate)	$SO_4^{=}$ (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	Total Dissolved Solids (sum) (mg/l)	Total Dissolved Solids (tons/day)	Total Dissolved Solids (tons/acre foot)	Ca+Mg Hardness (mg/l)
10/23	80	--	21	11	--	--	89	--	--	--	--	1.3	1.8	0.52	151	--	32.6	0.21	98
11/19	2400	--	17	3.9	--	--	73	--	--	--	--	0.22	1.0	0.21	130	--	778	0.16	59
12/20	7000	--	11	3.0	--	--	40	--	--	--	--	0.12	0.26	0.08	109	--	2060	0.15	40
1/29	4300	17	10	3.1	3.7	1.0	40	--	3.3	2.5	0.0	0.23	0.34	0.04	75	62	871	0.10	38
2/20	28000	12	6.1	2.8	6.4	0.9	31	--	2.9	3.1	0.0	0.06	0.53	0.22	--	50	3780	0.07	27
3/18	12200	--	7.8	3.7	--	--	44	0	--	--	--	0.05	0.31	0.12	76	--	2500	0.10	35
4/22	3270	--	9.0	3.6	--	--	45	0	--	--	--	2.3	2.3	0.05	62	--	547	0.08	37
5/21	2320	--	40	2.8	--	--	37	0	--	--	--	0.02	0.12	0.03	53	--	332	0.07	110
6/17	820	--	8.8	2.9	--	--	36	0	--	--	--	0.00	1.1	0.06	58	--	128	0.08	34
7/22	570	--	15	5.2	--	--	56	0	--	--	--	0.07	0.50	0.17	88	--	135	0.12	59
8/19	383	--	15	6.7	--	--	70	0	--	--	--	0.19	0.84	0.30	99	--	102	0.13	65
9/23	244	9.3	15	6.7	11	1.5	69	0	8.4	13	0.1	0.20	0.90	0.38	100	--	65.9	0.14	65

N = nitrogen
P + phosphorous

(Source: USGS, 1976)

Table 2-8

Water Quality Data For Umpqua River near Roseburg, Oregon - Water year 1975

Date	Specific Conductance (Micro-mhos)	pH	Turbidity (JTU)	Temperature ^{o}C	Temperature ^{o}F	Fecal Coliform col/100ml	Streptococci Colonies per/100ml	Dissolved Oxygen (mg/1)
10/23	225	7.3	7	13.0	55.4	1660	72	6.9
11/19	195	7.1	10	10.0	50.0	58200	1020	11.3
12/20	92	7.0	30	8.5	47.3	150	35	10.9
1/29	90	6.7	15	4.5	40.1	40	1	13.2
2/20	75	7.2	20	7.0	44.6	320	100	12.0
3/18	88	7.2	85	8.5	47.3	3100	2820	11.2
4/22	93	7.2	6	11.0	51.8	20	5	11.3
5/21	70	7.3	3	13.5	56.3	20	27	9.7
6/17	81	7.3	2	19.0	66.2	54	18	9.4
7/22	130	7.8	1	25.5	77.9	120	5	8.4
8/19	165	7.6	2	21.0	69.8	3060	80	7.8
9/23	185	7.7	2	20.0	68.0	2080	6	-

(Source: USGS, 1976)

Table 2-7

Chemical Quality of Umpqua River near Roseburg, Oregon for Water Year October 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	SiO_2 (mg/l) (Silica)	Ca^{++} (mg/l) (calcium)	Mg^{++} (mg/l) (magnesium)	Na^+ (mg/l) (sodium)	K^+ (mg/l) (Potassium)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^=$ (mg/l) (carbonate)	$SO_4^=$ (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	Total Dissolved Solids (sum) (mg/l)	Total Dissolved Solids (tons/day)	Total Dissolved Solids (tons/acre foot)	Ca+Mg Hardness (mg/l)
10/23	80	--	21	11	--	--	89	--	--	--	--	1.3	1.8	0.52	151	--	32.6	0.21	98
11/19	2400	--	17	3.9	--	--	73	--	--	--	--	0.22	1.0	0.21	130	--	778	0.16	59
12/20	7000	--	11	3.0	--	--	40	--	--	--	--	0.12	0.26	0.08	109	--	2060	0.15	40
1/29	4300	17	10	3.1	3.7	1.0	40	--	3.3	2.5	0.0	0.23	0.34	0.04	75	62	871	0.10	38
2/20	28000	12	6.1	2.8	6.4	0.9	31	--	2.9	3.1	0.0	0.06	0.53	0.22	--	50	3780	0.07	27
3/18	12200	--	7.8	3.7	--	--	44	0	--	--	--	0.05	0.31	0.12	76	--	2500	0.10	35
4/22	3270	--	9.0	3.6	--	--	45	0	--	--	--	2.3	2.3	0.05	62	--	547	0.08	37
5/21	2320	--	40	2.8	--	--	37	0	--	--	--	0.02	0.12	0.03	53	--	332	0.07	110
6/17	820	--	8.8	2.9	--	--	36	0	--	--	--	0.00	1.1	0.06	58	--	128	0.08	34
7/22	570	--	15	5.2	--	--	56	0	--	--	--	0.07	0.50	0.17	88	--	135	0.12	59
8/19	383	--	15	6.7	--	--	70	0	--	--	--	0.19	0.84	0.30	99	--	102	0.13	65
9/23	244	9.3	15	6.7	11	1.5	69	0	8.4	13	0.1	0.20	0.90	0.38	100	--	65.9	0.14	65

N = nitrogen
P + phosphorous

(Source: USGS, 1976)

Table 2-8
Water Quality Data For Umpqua River near Roseburg, Oregon - Water year 1975

Date	Specific Conductance (Micro-mhos)	pH	Turbidity (JTU)	Temperature °C	Temperature °F	Fecal Coliform col/100ml	Streptococci Colonies per/100ml	Dissolved Oxygen (mg/l)
10/23	225	7.3	7	13.0	55.4	1660	72	6.9
11/19	195	7.1	10	10.0	50.0	58200	1020	11.3
12/20	92	7.0	30	8.5	47.3	150	35	10.9
1/29	90	6.7	15	4.5	40.1	40	1	13.2
2/20	75	7.2	20	7.0	44.6	320	100	12.0
3/18	88	7.2	85	8.5	47.3	3100	2820	11.2
4/22	93	7.2	6	11.0	51.8	20	5	11.3
5/21	70	7.3	3	13.5	56.3	20	27	9.7
6/17	81	7.3	2	19.0	66.2	54	18	9.4
7/22	130	7.8	1	25.5	77.9	120	5	8.4
8/19	165	7.6	2	21.0	69.8	3060	80	7.8
9/23	185	7.7	2	20.0	68.0	2080	6	-

(Source: USGS, 1976)

Table 2- 7

Chemical Quality of Umpqua River near Roseburg, Oregon for Water Year October 1974 to September 1975

Date	Instantaneous Discharge ft³/sec (flow rate)	SiO_2 (mg/l) (Silica)	Ca^{++} (mg/l) (calcium)	Mg^{++} (mg/l) (magnesium)	Na^+ (mg/l) (sodium)	K^+ (mg/l) (Potassium)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^=$ (mg/l) (carbonate)	$SO_4^=$ (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	Total Dissolved Solids (sum) (mg/l)	Total Dissolved Solids (tons/ day)	Total Dissolved Solids (tons/ acre foot)	Ca+Mg Hardness (mg/l)
10/23	80	--	21	11	--	--	89	--	--	--	--	1.3	1.8	0.52	151	--	32.6	0.21	98
11/19	2400	--	17	3.9	--	--	73	--	--	--	--	0.22	1.0	0.21	130	--	778	0.16	59
12/20	7000	--	11	3.0	--	--	40	--	--	--	--	0.12	0.26	0.08	109	--	2060	0.15	40
1/29	4300	17	10	3.1	3.7	1.0	40	--	3.3	2.5	0.0	0.23	0.34	0.04	75	62	871	0.10	38
2/20	28000	12	6.1	2.8	6.4	0.9	31	--	2.9	3.1	0.0	0.06	0.53	0.22	--	50	3780	0.07	27
3/18	12200	--	7.8	3.7	--	--	44	0	--	--	--	0.05	0.31	0.12	76	--	2500	0.10	35
4/22	3270	--	9.0	3.6	--	--	45	0	--	--	--	2.3	2.3	0.05	62	--	547	0.08	37
5/21	2320	--	40	2.8	--	--	37	0	--	--	--	0.02	0.12	0.03	53	--	332	0.07	110
6/17	820	--	8.8	2.9	--	--	36	0	--	--	--	0.00	1.1	0.06	58	--	128	0.08	34
7/22	570	--	15	5.2	--	--	56	0	--	--	--	0.07	0.50	0.17	88	--	135	0.12	59
8/19	383	--	15	6.7	--	--	70	0	--	--	--	0.19	0.84	0.30	99	--	102	0.13	65
9/23	244	9.3	15	6.7	11	1.5	69	0	8.4	13	0.1	0.20	0.90	0.38	100	--	65.9	0.14	65

N = nitrogen
P + phosphorous

(Source: USGS, 1976)

Table 2-8

Water Quality Data For Umpqua River near Roseburg, Oregon - Water year 1975

Date	Specific Conductance (Micro-mhos)	pH	Turbidity (JTU)	Temperature ^{o}C	Temperature ^{o}F	Fecal Coliform col/100ml	Streptococci Colonies per/100ml	Dissolved Oxygen (mg/l)
10/23	225	7.3	7	13.0	55.4	1660	72	6.9
11/19	195	7.1	10	10.0	50.0	58200	1020	11.3
12/20	92	7.0	30	8.5	47.3	150	35	10.9
1/29	90	6.7	15	4.5	40.1	40	1	13.2
2/20	75	7.2	20	7.0	44.6	320	100	12.0
3/18	88	7.2	85	8.5	47.3	3100	2820	11.2
4/22	93	7.2	6	11.0	51.8	20	5	11.3
5/21	70	7.3	3	13.5	56.3	20	27	9.7
6/17	81	7.3	2	19.0	66.2	54	18	9.4
7/22	130	7.8	1	25.5	77.9	120	5	8.4
8/19	165	7.6	2	21.0	69.8	3060	80	7.8
9/23	185	7.7	2	20.0	68.0	2080	6	-

(Source: USGS, 1976)

Table 2- 7
Chemical Quality of Umpqua River near Roseburg, Oregon for Water Year October 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	SiO_2 (mg/l) (Silica)	Ca^{++} (mg/l) (calcium)	Mg^{++} (mg/l) (magnesium)	Na^+ (mg/l) (sodium)	K^+ (mg/l) (Potassium)	HCO_3^- (mg/l) (bicarbonate)	$CO_3^=$ (mg/l) (carbonate)	$SO_4^=$ (mg/l) (sulfate)	Cl^- (mg/l) (chloride)	F^- (mg/l) (fluoride)	Nitrate & Nitrite (mg/l)	Total N (mg/l)	Total P (mg/l)	Total Dissolved Solids (residue) (mg/l)	(sum) (mg/l)	(tons/ day)	(tons/ acre foot)	Ca+Mg Hardness (mg/l)
10/23	80	--	21	11	--	--	89	--	--	--	--	1.3	1.8	0.52	151	--	32.6	0.21	98
11/19	2400	--	17	3.9	--	--	73	--	--	--	--	0.22	1.0	0.21	130	--	778	0.16	59
12/20	7000	--	11	3.0	--	--	40	--	--	--	--	0.12	0.26	0.08	109	--	2060	0.15	40
1/29	4300	17	10	3.1	3.7	1.0	40	--	3.3	2.5	0.0	0.23	0.34	0.04	75	62	871	0.10	38
2/20	28000	12	6.1	2.8	6.4	0.9	31	--	2.9	3.1	0.0	0.06	0.53	0.22	--	50	3780	0.07	27
3/18	12200	--	7.8	3.7	--	--	44	0	--	--	--	0.05	0.31	0.12	76	--	2500	0.10	35
4/22	3270	--	9.0	3.6	--	--	45	0	--	--	--	2.3	2.3	0.05	62	--	547	0.08	37
5/21	2320	--	40	2.8	--	--	37	0	--	--	--	0.02	0.12	0.03	53	--	332	0.07	110
6/17	820	--	8.8	2.9	--	--	36	0	--	--	--	0.00	1.1	0.06	58	--	128	0.08	34
7/22	570	--	15	5.2	--	--	56	0	--	--	--	0.07	0.50	0.17	88	--	135	0.12	59
8/19	383	--	15	6.7	--	--	70	0	--	--	--	0.19	0.84	0.30	99	--	102	0.13	65
9/23	244	9.3	15	6.7	11	1.5	69	0	8.4	13	0.1	0.20	0.90	0.38	100	--	65.9	0.14	65

N = nitrogen
P + phosphorous

(Source: USGS, 1976)

Table 2-8
Water Quality Data For Umpqua River near Roseburg, Oregon - Water year 1975

Date	Specific Conductance (Micro-mhos)	pH	Turbidity (JTU)	Temperature ^{o}C	^{o}F	Fecal Coliform col/100ml	Streptococci Colonies per/100ml	Dissolved Oxygen (mg/1)
10/23	225	7.3	7	13.0	55.4	1660	72	6.9
11/19	195	7.1	10	10.0	50.0	58200	1020	11.3
12/20	92	7.0	30	8.5	47.3	150	35	10.9
1/29	90	6.7	15	4.5	40.1	40	1	13.2
2/20	75	7.2	20	7.0	44.6	320	100	12.0
3/18	88	7.2	85	8.5	47.3	3100	2820	11.2
4/22	93	7.2	6	11.0	51.8	20	5	11.3
5/21	70	7.3	3	13.5	56.3	20	27	9.7
6/17	81	7.3	2	19.0	66.2	54	18	9.4
7/22	130	7.8	1	25.5	77.9	120	5	8.4
8/19	165	7.6	2	21.0	69.8	3060	80	7.8
9/23	185	7.7	2	20.0	68.0	2080	6	-

(Source: USGS, 1976)

Table 2-9

Summary of Water Quality of Major Perennial Streams in Josephine SYU by Source

State of Oregon, Department of Environmental Quality, February 1976

Name of Stream Location of Station	Temperature °C-°F Jun - Oct Nov - May	Temperature °C-°F	Dissolved Oxygen mg/l Jun - Oct Nov - May	Dissolved Oxygen % Saturation Jun - Oct Nov - May	Turbidity JTU Jun - Oct Nov - May	Total Dissolved Solids Jun - Oct Nov - May	Chloride Jan - Dec	Mph Tc/100ml Jun - Oct Nov - May	Flow Ft^3/sec Jun - Oct Nov - May
Rogue River	10-50	25-77	8.1 - 12.0	87 - 135	1 - 15	46 - 90	0.5 - 4.3	45 - 24,000	750 - 4750
at Grants Pass	2-36	12-54	10.7 - 13.5	93 - 111	- 1	65		230 - 24,000	1417 - 8290
Rogue River	10-50	25-77	7.8 - 11.5	83 - 124	2 - 17	64 -106	0.8 - 4.3	230 - 7,000	-- --
2.5 mi. west of	3-37	13-55	11.0 - 13.1	97 - 112	- 1	64		600 - 7,000	-- --
Grants Pass									
Rogue River	11-52	26-79	7.9 - 12.0	87 - 135	0 - 25	36 -136	0.5 - 9.8	45 - 7,000	-- --
at Robertson	4-39	14-57	10.8 - 13.0	97 - 114	0 - 33	53 -174		230 - 7,000	-- --
Bridge									
Rogue River	14-57	22-72	8.0 - 10.3	89 - 108	1 - 15	39 - 98	0.5 - 4.9	45 - 700	-- --
below Grave Creek--	11-52		11.6	107	4	25		7,000 --	--
Applegate River	10-50	26-79	8.1 - 12.4	84 - 147	0 - 48	30 -159	0.5 -46.2	45 - 2,400	11 - 716
at Applegate	4-39	13-55	9.8 - 12.8	98 - 107	1 - 16	69 -179		45 - 7,000	77 - 1150
Applegate River	12	28	7.5 - 12.3	78 - 138	0 - 20	43 -140	0.2 - 9.7	45 - 2,400	-- --
at Wilderville	5	14	10.4 - 12.4	92 - 108	1 - 42	45 - 99		60 - 7,000	-- --
Cow Creek	14	26	7.5 - 10.3	89 - 115	1 - 15	84 -129	0.2 -18	60 - 7,000	-- --
at Glendale	5	16	9.6 - 12.0	91 - 100	2 - 65	64 -109		000 - 2,400	-- --

U.S. Environmental Protection Agency, Storet Data (Computer Retrieval Service for Water Quality), Data for Josephine SYU as of 5-2-77
(All numbers given are mean values for all samples taken over a three year period from January 1973 to August 1976)

Name of Stream Location of Station	Temperature °C	Temperature °F	Turbidity JTU	Conductivity Micromhos @ 25°C	Dissolved mg/l	Dissolved % Sat	Bod mg/l	pH	Total N mg/l	Total P mg/l	Total Org. C mg/l	Chloride mg/l	Sulfate mg/l	Total Californ MPN Conf/100ml
W. Fork Illinois River at Hwy 199 Bridge	-	-	-	-	-	-	-	-	-	-	4.7	-	-	-
Sucker Creek at Takilma Rd. Bridge	13	55	2.8	95	9.7	94.8	0.35	7.2	0.5	0.2	3.5	1.7	1.9	489.2
Louse Creek at Pleasant Vally Rd. Br.	18.6	65.5	4.0	110	7.9	98.0	0.7	7.5	-	-	-	-	-	450
Quartz Creek at Mouth	13.3	55.9	3.0	95	9.4	98.0	0.5	7.2	-	-	-	-	-	450
Jumpoff Joe Creek At Russel Rd. Br.	17.3	63.1	-	120	9.2	100	0.5	7.6	-	-	-	-	-	450

See Figure 2-9 for locations of stream gauging stations

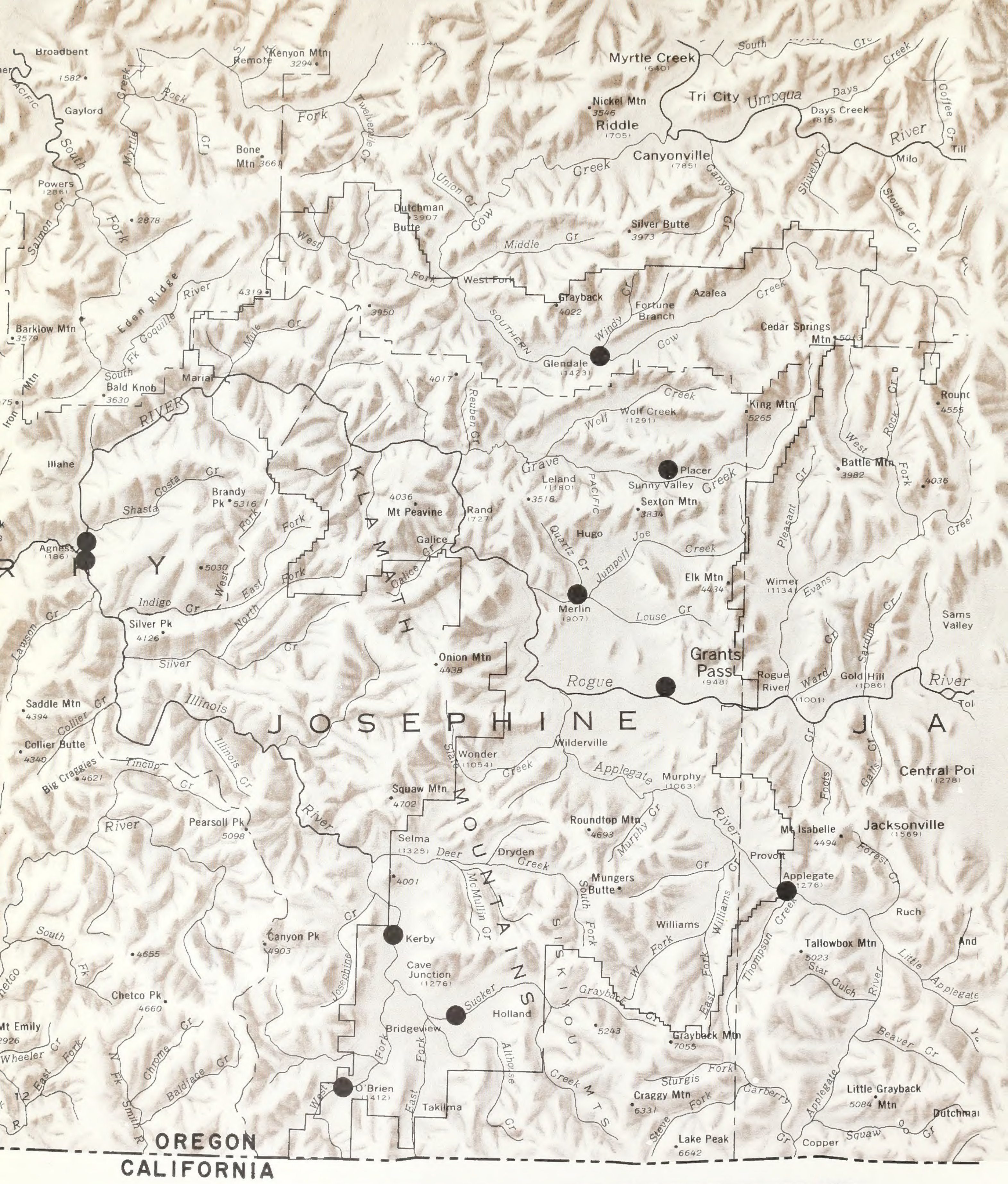


Figure 2-9 LOCATIONS OF STREAM GAUGING STATIONS
SOURCE: USGS, 1976

2.1.1.5 Fire

Wild Fire Occurrences

While there is extreme variation from year to year, the predominant cause of wild fire is lightning. Man-caused fires, ranging from arson to automobile accidents and plane crashes, however, result in considerably more resource damage and acres burned. Table 2-10 shows fire occurrence in the JSYU since 1966.

Over the period analyzed, 173 lightning strikes burned 141 acres. Although one fire (Quail Creek in 1970) of 2269 public land acres skews the data, man's actions in the same time period caused resource damage to 3268 acres from only 65 fire occurrences.

The fire season in the SYU generally begins in May and often lasts until the middle of October. Weather patterns during this time of year are generally conducive to forest fires due to the hot, dry summer and numerous isolated thunderstorms. It is also the season of increased recreational usage of the forest.

Fire Protection

In western Oregon, BLM contracts all fire presuppression and fire fighting operations to the Oregon State Board of Forestry.

Table 2-10

Fire Occurrence on Public Lands
in the Josephine Sustained Yield Unit

	Lightning-Caused		Man-Caused	
Year	Number	Acres[1/]	Number	Acres[1/]
1966	25	25	5	197
1967	--	--	2	68
1968	4	2	6	71
1969	15	35	7	21
1970	6	4	7	2481
1971	2	1	2	4
1972	15	6	3	2
1973	27	21	11	346
1974	29	20	13	10
1975	43	25	7	64
1976	7	2	2	4
	173	141	65	3268

1/ Estimates rounded; class A fires figured at 0.25 acres each.
Source: BLM Fire Reports on file Oregon State Office.

Where special or extra protection is desired, the fire plan and contracts provide for this. Within the SYU 125,000 acres adjacent to the Rogue Wild and Scenic River have been covered by special protection provisions since 1970.

2.1.2 Biological Environment

Common names are used, where possible, for all plants and animals discussed in this section. A complete list of common and scientific names for all organisms discussed will be made available on request. In some cases, such as several of the endangered plants, no common names exist and, therefore, scientific names must be used in the text.

2.1.2.1 Vegetation

Terrestrial Vegetation

Terrestrial vegetation is described in terms of "zones" adapted from those identified by Franklin & Dyrness (USDA, 1973) in their Natural Vegetation of Oregon and Washington. Unless otherwise noted, all terrestrial vegetation data are drawn from that source.

Zones within the JSYU are as follows:

1) Interior Valleys Zone (pines, oaks and Douglas-fir).

2) Douglas-fir/Hardwoods Zone (Douglas-fir, evergreen hardwood).

3) Mixed Conifers Zone (Douglas-fir, pines, incense-cedar and true firs).

4) White Fir Zone (white fir).

The arrangement of these zones in the eastern and western Siskiyou Mountains of the JSYU is shown in Figure 2-10. The acreage distribution of these zones by land jurisdiction is given in Table 2-11. Waring (1969) has identified the floristic boundary between the eastern and western Siskiyous as far north as the Rogue River. Lacking botanical studies to fix the boundary north from the Rogue River, a probable boundary has been projected based on climate, geology, and observed vegetation patterns.

Numerous plant communities may occur in each vegetation zone. Forest stratification, i.e. layering, differs considerably with plant community. Forest stratification for a "typical" Douglas-fir hardwoods zone community is illustrated in Figure 2-11.

Interior Valleys Zone

This zone refers to the lowlands and valley bottoms enclosed by the Siskiyou (Klamath) Mountains. Approximately 245,000 acres in the SYU is within this zone. Although scattered conifer forests occur here, only about 6.8 per cent of the public lands within the zone is considered commercial forest land (Table 2-11). Plant communities include grasslands, oak woodlands, evergreen shrub lands (sometimes called chaparral), scattered conifer forests, and streamside (riparian) forests (Franklin and Dyrness). The occurrence of these communities is dependent upon temperature, moisture, and soil factors. Their distribution does not reflect successional trends. Each of these plant communities is described in detail in the sections which follow.

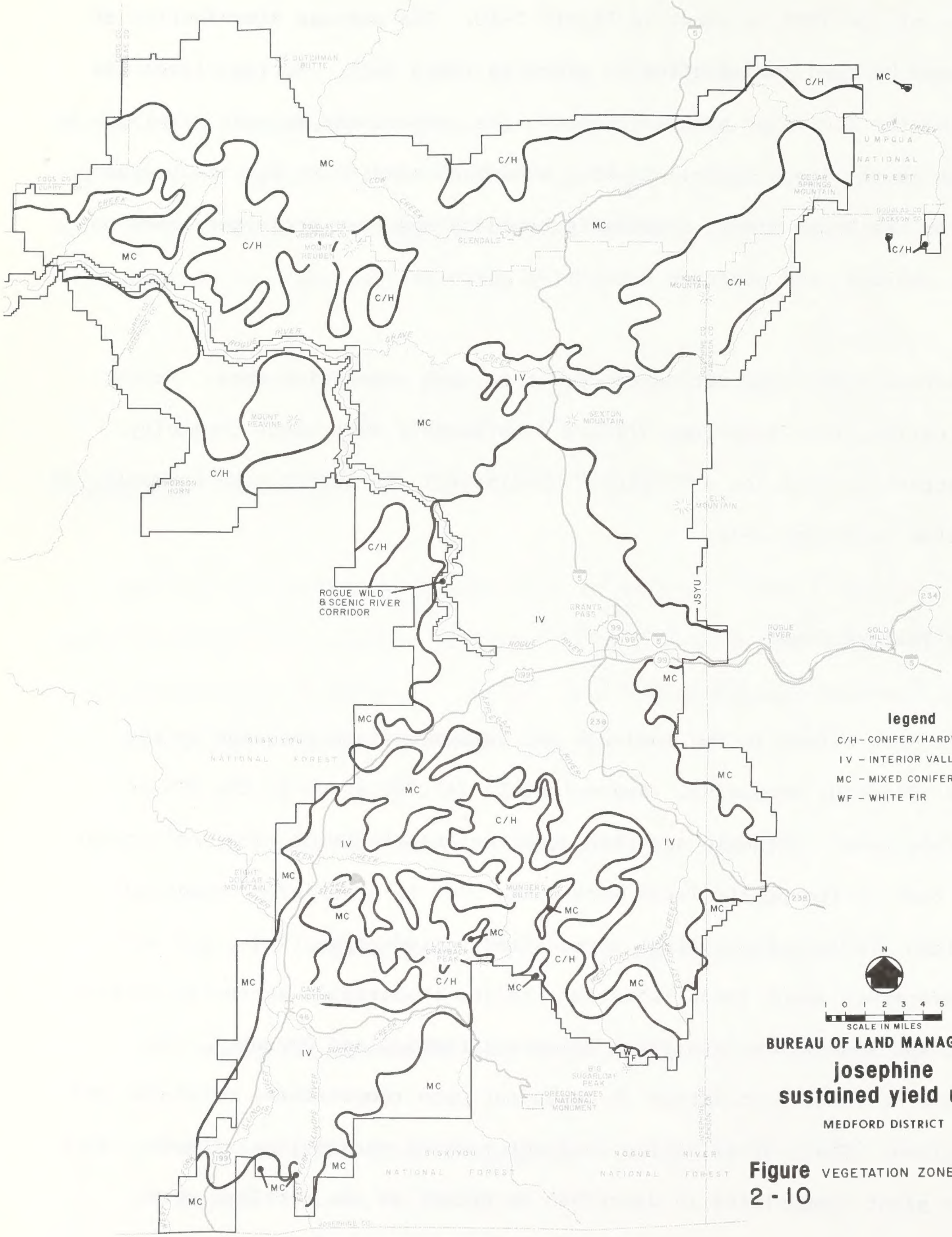


Figure 2-10 VEGETATION ZONES

Table 2-11

Vegetation Zone Tabulations by Land Jurisdiction

Public Lands

	Acres	% Public[1]	% Total[2] SYU	% Zone[3] Total	Acres Comm'l Forest	% of Public in SYU	% of Comm'l Forest on Public
Interior Valleys	39814	9.4	4.7	16.3	15595	3.7	6.8
Douglas-fir /hardwoods	154493	36.3	18	81.1	87109	20.5	38.0
Mixed Conifer	230489	54.1	26.9	54.8	125905	29.6	54.9
White Fir	924	.2	.1	96.2	701	.2	.3
Totals	425720	100	49.7		229310	54	100

Other Jurisdictions

	Acres	% of Other	% Total SYU	% Zone Total
Interior Valleys	204655	47.5	23.9	83.7
Douglas-fir/ Hardwoods	35969	8.3	4.2	18.9
Mixed Conifer	190464	44.2	22.2	45.2
White Fir	36	N	N	3.8
Total	431124	100	50.3	

1 % Public = The percentage of public lands within the SYU occupied by each specified vegetational zone.

2 % Total SYU = The percentage of all lands in the SYU regardless of jurisdiction, occupied by each specified vegetation zone.

3 % Zone Total = The percentage of the vegetation zone occurring within each land jurisdiction.

4 % of Commercial Forest on Public Land = The percentage of public land in each zone identified in the TPCC as Commercial Forest Lands (not all of which are included in the high intensity category).

N = Negligible

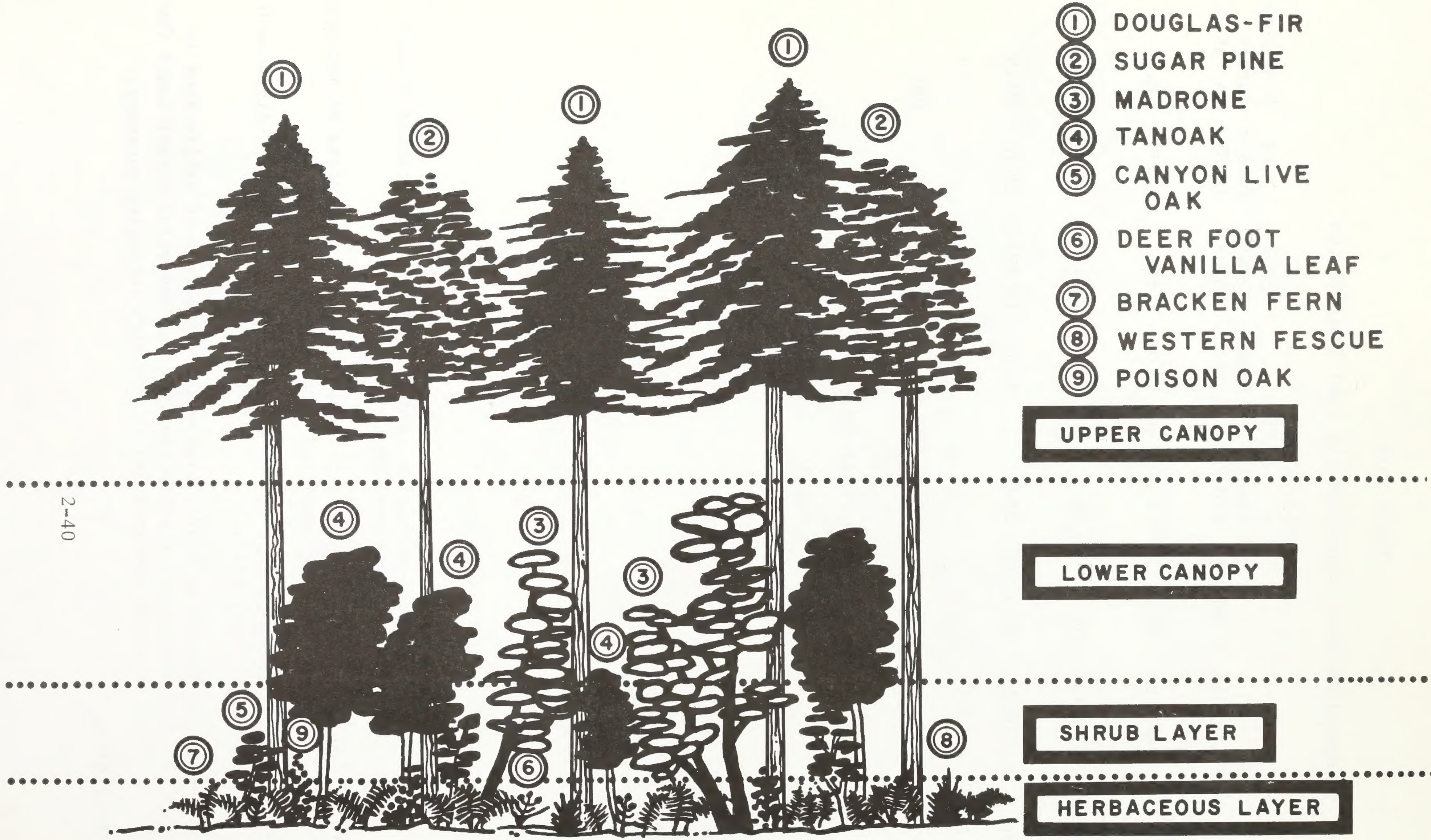


Figure 2-11 TYPICAL FOREST STRATIFICATION • MIXED EVERGREEN ZONE
SOURCE: After Franklin and Dyrness, 1973

Grasslands. Grassland communities generally occur on the low elevation foothills and steep, south facing slopes that are too dry to support trees. The dominant grass is Idaho fescue. Bluebunch wheatgrass, Junegrass and pine bluegrass are common. Alaska onion-grass and mountain brome are frequently found on more moist sites in the foothills. Other commonly occurring grasses include blue wildrye, western and California fescues, California oatgrass and Canada bluegrass. A wide variety of forbs are present including collomia, brodiaea, bedstraw, lomatium, dusty pink, yarrow, coyote mint, and wooly eriophyllum (Hickman, 1976).

Oak Woodlands. The Interior Valleys Zone is characterized by forest stands, groves, and savannas dominated by the deciduous Oregon white oak, California black oak and the evergreen Pacific madrone. Typical shrubby species, though occurring infrequently, include Pacific poison oak, California honeysuckle, white-leaved manzanita, Klamath plum, and birchleaf mountain mahogany (Hickman, 1976). The grasses and forbs growing beneath the oaks are similar to those found in the open grasslands. These oak woodlands are the driest forest formations in the JSYU. On more moist sites and northeast slopes, Douglas-firs, ponderosa pines, and incense-cedars penetrate the oak canopy. On drier sites, the oak canopy decreases and annual grasses and forbs increase. South and southwest slopes are commonly grasslands with only a few scattered oaks or none at all.

Evergreen Shrublands (Chaparral). Numerous evergreen shrub communities occur within the Interior Valleys Zone. Some of these chaparral communities

are climax, whereas others are maintained by recurring fires. Predominant species include deerbrush, wedgeleaf ceanothus, Pacific poison oak, skunkbrush sumac, white-leaved manzanita, hoary manzanita, curlleaf mountain mahogany, pale serviceberry, and white stem rabbitbrush. The understory is dominated by Idaho fescue. A variety of forbs such as brodiaea, bedstraw, and collomia are also present (Hickman, 1976).

Conifer Forests. Hillcrests and more moist slopes within the Interior Valleys Zone support a ponderosa pine - hardwood community. Douglas-fir, incense-cedar, and sometimes white fir are associated with the ponderosa pine. Typical hardwoods found with the conifers include bigleaf maple, Oregon white oak, California black oak and Pacific madrone.

Douglas-fir/Hardwoods Zone

Approximately 38 per cent of the commercial forest land on public lands within the SYU is located in the Douglas-fir/hardwoods zone. Most sites within the zone are generally occupied by a mixed forest of evergreen needle-leaved trees (upper strata) and evergreen broadleaved trees (lower strata). This zone grades into the Interior Valleys Zone at its lower elevational limit and into the White Fir Zone at its higher elevational limit. In the eastern Siskiyous, this zone is replaced by the Mixed Conifers Zone.

Forest Composition. The upper canopy is dominated by Douglas-fir, with sugar pine frequently present on ridge tops and south- and west-facing slopes.

The lower, evergreen broad-leaved (sclerophyll) tree canopy is dominated by tanoak associated with canyon live oak, Pacific madrone, and golden chinquapin. Douglas-fir and tanoak are considered to be the major climax species in this vegetative zone. The shrub layer averages about 30 per cent coverage and is typically composed of canyon live oak, Oregon grape, trailing blackberry, baldhip rose, and Pacific poison oak.

On more moist sites, Port-Orford-cedar and Douglas-fir or western redcedar and western hemlock dominate the overstory. Small broadleaved evergreen trees are present but not dominant. Western yew, vine maple, California hazel, white alder, and Pacific dogwood are typical understory species along with rhododendron, salal, Oregon grape, trailing blackberry, twinflower, sword fern, and deerfoot vanilla leaf.

On drier sites, a sclerophyll/Douglas-fir community is dominant. It is characterized by an overstory (with less than 50 per cent crown coverage) of Douglas-fir and a closed canopy of sclerophylls. Tanoak is characteristically the dominant sclerophyll, but Pacific madrone and canyon live oak are also abundant. Typical shrubs are baldhip rose, Pacific poison oak, and trailing blackberry. Similar stands, but lacking Douglas-fir, occur frequently on south slopes.

Knobcone pine often regenerates after wildfires within this zone. It forms extensive, pure stands, particularly on the drier sites.

Special Communities. Except for the unique vegetation found on serpentine sites (described in "Vegetation of Unique Habitats"), dense evergreen chaparral brushfields are the most conspicuous "special community" found within the Douglas-fir/Hardwoods Zone. Typical species are hoary and green manzanitas, tanoak, canyon live oak, huckleberry oak, Sadler oak, small golden chinquapin, bear bush, boxleaved garrya (silktassel), California coffee berry, gooseberry, currant, mountain whitethorn ceanothus, and pygmy Oregon grape.

Mixed Conifers Zone

The Mixed Conifers Zone occupies elevations from about 2,500 to 4,500 feet in the eastern Siskiyou Mountains. This zone accounts for approximately 55 per cent of the commercial forest on public lands within the SYU (Table 2-11). It is bounded by the Interior Valleys Zone at its lower limit and by the White Fir Zone at its upper limit.

Forest Composition. Major tree species in this zone are Douglas-fir, sugar pine, ponderosa pine, incense-cedar, and white fir, with Douglas-fir the most abundant. The white fir, as discussed here, is part of the grand fir-white fir species complex common in southwestern Oregon. Some population of trees resemble grand fir while others resemble white fir. In this ES, all true fir populations are referred to as white fir.

Incense-cedar appears to be less common in the eastern Siskiyous. Sugar pine and ponderosa pine usually occur as scattered individuals but give

the forests much of their character. The proportion of incense-cedar is greatest on the drier sites. White fir is often present mainly as seedlings and saplings in existing mixed-conifer stands. Other typical tree species include bigleaf maple and Pacific madrone. Characteristic understory species include California hazel, creambush oceanspray, golden chinquapin, creeping snowberry, trailing blackberry, and baldhip rose.

Special Communities. No forested "special types" have been described for the Mixed Conifers Zone.

White Fir Zone

This zone occupies a relatively narrow elevational belt above 5,400 feet in the eastern Siskiyous. It provides about .3 per cent of the commercial forest land in the SYU. The zone grades into the Mixed Conifers Zone at its lower limit.

Forest Composition. White fir is the major tree species within this zone, often forming pure or nearly pure stands. The most common associate is Douglas-fir. Sugar pine, ponderosa pine and western white pine may also be present in small numbers. Incense-cedar is often found on moderately moist sites. Shasta red fir is increasingly common toward the upper limit of the zone.

Characteristic understory species include creambush oceanspray, baldhip rose, Oregon grape, California hazel, Rocky Mountain maple, trailing blackberry, snow dewberry, Saskatoon serviceberry, and golden chinquapin.

Successional Patterns

Although plant community succession is virtually unknown in the JSYU, several identifiable seral habitat types generally result following a canopy-removing disturbance in coniferous forest communities. A brief grass and herb stage is followed by a slightly longer stage dominated by shrubs and coniferous seedlings, with some grass and herbaceous ground cover still remaining. The shrub/sapling stage is then gradually replaced by the pole/sapling stage in which conifer growth is fairly rapid, eventually causing crown closure and the diminishing of understory vegetation. The young second growth seral stage follows the pole/sapling stage. During the young second growth stage, the conifers undergo rapid height and diameter growth. Only shade tolerant plants remain in the understory. The mature and old growth successional stages, respectively, follow the young second growth stage. Conifer growth rate slows and the incidence of tree disease and mortality increases.

Climax vegetation types are not definitely known in the JSYU. It appears that Douglas-fir, Ponderosa pine-oaks and chaparral may be the potential climatic climax communities in the Interior Valleys Zone.

On dry slopes and sites with south exposures and/or shallow soils in the conifer/hardwoods zone, chapparal communities are climax. These

communities are dominated by hard-leaved shrubs such as hoary and green manzanitas. Brushfields dominated by softer-leaved shrubs or tanoak, chinquapin and Pacific Madrone will probably be replaced by conifers, conifer-tanoak or conifer-chinquapin mixtures.

White fir is the major climax species over the entire mixed conifers zone. Fires and logging keep white fir from dominating the overstory, but its potential as climax species is indicated by its dominance in reproductive size classes. On warm, dry sites, Douglas-fir and/or incense cedar appear to be climax. On more moist habitats, white fir is climax.

White fir appears to be the sole climax species in the White Fir Zone, although incense cedar and/or Douglas-fir may be climax associates.

Although the plant species composition, relative abundance and duration of these seral stages is unknown in the JSYU, a rough estimate of their natural durations, in sequence, following initial disturbance is:

Grass/forb:	0 years
Shrub/seedling:	0-15 years
Pole/sapling:	16-40 years
Young second growth:	41-119 years
Mature:	120-200 years
Old growth:	201+ years
Climax:	?

Acres in each seral stage, within each vegetation zone, were computed for commercial forest lands in the JSYU base for allowable cut determination (see Table 1-3). Data for the computations were obtained from five point inventory

age class determinations (Section 1.4.1.1, 1976 reinventory discussion). Such data, however, are not directly applicable for seral stage tabulations because age classes are assigned on the basis of the approximate ages of commercial timber species and do not consider the presence of non-commercial plants. Regeneration difficulties on a particular plot may have precluded the establishment of commercial species for many years after initial forest disturbances; nonetheless that plot is assigned an age class equal to that of newly established commercial species. All plots which, for one reason or another, do not contain commercial species are classified as "non-stocked" regardless of the age of existing vegetation. Also, age classes are given in ten-year increments, which makes it impossible to objectively tabulate the grass/forb successional stage (which generally persists for less than ten-years) from age class data.

Therefore it is necessary to assume that, on good sites, the first two seral stages (grass/forb and shrub/seedling) will have been succeeded by the pole/sapling stage by age class 20 and that later seral stages can be more accurately tabulated from age class data. The acreages so computed for these seral stages, by vegetation zone are:

	Interior valleys Zone	Douglas fir/ hardwoods Zone	Mixed Conifer Zone	White fir Zone	Totals
Grass/forb and Shrub/seedling	704	8,920	14,839		24,463
Pole/sapling	624	6,244	4,946		11,814
Young second growth	4,055	16,947	19,785		40,787
Mature	1,560	19,623	18,548		39,731
Old growth	8,733	37,463	65,618	701	112,515
	15,676	89,197	123,736	701	229,310

Vegetation of Unique Habitats

Serpentine Soils. Serpentine areas are characterized by unusual plant communities and vegetation. Plants are stunted on serpentine soils in comparison with those on adjacent nonserpentine soils.

Serpentine areas in this discussion are habitats with soils low in calcium and high in magnesium, chromium, and nickel. (A full description of serpentine soils is given in the Soil Inventory of the Medford District pages 14, 97 and 98.) Areas of serpentine soils are shown in Figure 2-8.

Forest Composition. The outstanding feature of serpentine sites is the Jeffrey pine/grass woodland which occupies the driest serpentine sites between 1,000 and 6,500 feet in elevation. Jeffrey pine is typically the only tree species present, along with a sparse growth of grasses (e.g. lemon needlegrass, big squirreltail, Geyer oniongrass, blue wildrye, and sheep fescue) and an occasional white-leaved manzanita.

Forests intermediate in elevation and moisture are typified by a sparse, dry appearance and are dominated by a mixture of Douglas-fir, incense-cedar, Jeffrey pine, sugar pine, and knobcone pine. Associated with these trees is evergreen brush including huckleberry oak, tanoak, red huckleberry, box-leaved garrya (silktassel) and Oregon myrtle.

Other community types on serpentines include: (1) Port-Orford-cedar/Douglas-fir stands in ravines and draws, with a dense, shrubby understory and (2) higher elevation forests dominated by white fir, Douglas-fir, and western white pine, singly or collectively, over an understory of common beargrass and pine-mat manzanita.

Serpentine Indicator Plants. Common serpentine indicator plants include Jeffrey pine, podfern, dwarf ceanothus, common woolly sun-flower and small-flowered willowweed.

Streamside (Riparian) Vegetation. Oregon ash and Port-Orford Cedar are very characteristic species of streamside habitats in the interior valleys within Josephine SYU as well as in the adjacent, higher elevation forest zones. Bigleaf maple also occurs commonly. Understories vary widely from nearly nothing under dense stands to herbaceous (with sedges being characteristic) or densely shrubby types.

Aquatic Vegetation

The majority of aquatic plant communities within the JSYU are lotic (running water) communities. Although some lake or pond (lentic) habitat occurs on private lands, it is limited to a few, mostly ephemeral, ponds on BLM lands. The predominant aquatic plant habitats on BLM lands within the JSYU include streams, rivers, seeps and springs.

Stream and River Communities

In streams and other moving waters two major habitat zones are generally evident: the rapids zone and the pool zone. The rapids zone is usually shallow water where the speed of the current is great enough to keep the bottom clear of silt and other loose materials, thus providing a firm bottom. This zone is occupied largely by specialized rooted or clinging plants.

The pool zone is generally deeper water with a reduced current; silt and other loose materials tend to settle here, providing a soft bottom. The soft bottom is more favorable for some kinds of plankton and less favorable for rooted plants.

Phytoplankton, is the most prevalent aquatic vegetation found in running water. In small streams, plankton originates in ponds or backwaters connected with streams and is carried downstream, often being destroyed as it passes through rapids. Only in slow-moving portions of streams and in the larger Illinois and Rogue Rivers is plankton able to grow and multiply.

Permanently attached plants often found in streams and rivers include certain green algae (such as cladophores), encrusting diatoms and certain mosses (such as fontinales spp.).

Seeps and Springs

Seeps and springs are numerous and widespread in the JSYU. The plant communities associated with seeps and springs seem to be in a steady state with little change occurring over time. Spring and seep communities are also characterized by relatively small numbers of species. Plankton is absent.

Threatened and Endangered Plants

As provided by the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service published (Federal Register 40(127) 27828-27924 1975; F.R. 41(117) 24524-24572. 1976) lists of more than 1700 species of vascular plants proposed for endangered or threatened status. The Smithsonian Institution, which compiled the list, defined endangered plants as "those species in danger of extinction throughout all or a significant portion of their range." Threatened species were defined as those "likely to become endangered in the future."

A species is considered either threatened or endangered because of any one of the following five factors: "(1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) over utilization for

commercial, sporting, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or mandate (sic) factors affecting its continued existence."

Within the JSYU 26 threatened and endangered plant species are known to exist. Another 26 have been identified as possibly existing in the unit, but their presence is not confirmed. One species, Calochortus indecorus (a species of Mariposa lily), may be extinct. In the absence of a detailed inventory specific sites cannot be identified.

Most of these species are adapted to somewhat severe habitats. They typically occur on serpentine soils, in or near seeps and bogs, or on well-drained, droughty soils and rock outcrops. Table 2-12 lists rare, endangered and unique plant species in the JSYU. If known, their general habitats are included.

2.1.2.2 Animals

Vegetation is a primary determinant of animal habitat. Each vegetation zone described in Section 2.1.2.1 contains numerous plant communities. Habitat suitability is greatly influenced by the structure and composition of these communities in addition to climate and other physical variables, which also influence the occurrence of the plant communities.

Community structure and physical environmental features are essentially the same within one vegetation zone and may be similar enough among zones to

Table 2-12

Threatened and Endangered Plants Known, or Expected, to Occur in the Josephine Sustained Yield Unit[1]

Scientific Name	Confirmed Location	Status[2]
APIACEAE		
Perideridia erythrorhiza	Unconfirmed	T1
Sanicula tracyi	Unconfirmed	E2,E3
Tauschia howellii	Unconfirmed	T1
ASTERACEAE		
Antennaria suffructescens	Josephine Co.; Ore. Mtn. nr. Waldo	T1
Arnica viscosa	Unconfirmed	T1
Aster curtus	Unconfirmed	T1,E3
Erigeron bloomeri var. nudatus	Fiddler Mtn.; nr. Cave Jct.	T1
Erigeron delicatus	Unconfirmed	E2,E3
Haplopappus racemosus congestus	Unconfirmed	T1
Lasthenia macrantha prisca	Unconfirmed	T1
Microseris howellii	Unconfirmed	T1
M Laciniata detlingii	Unconfirmed	T1
M. nutans siskiyouensis	Unconfirmed	E2,T3,D3
Senecio hesperius	Josephine Co.	T1
BERBERIDACEAE		
Vancouveria chrysantha	old Ore. Mtn. Rd.	T1
BORAGINACEAE		
Plaigiobothrys hirtus corallicarpa	Unconfirmed	T1
P. h. hirtus	Unconfirmed	E2,E3
P. lamprocarpus	Unconfirmed	E2,E3
BRASSICACEAE		
Arabis aculeolata	nr. Cave Jct.; nr. Hellgate; Eight Dollar Mtn.	T1
A. koehleri var. stipitata	nr. Cave Jct.	T1
A. modesta	Rogue River canyon	E3
A. oregana	old Oregon Mtn. Rd.	T1

Refer to footnotes at end of Table.

Table 2-12 (Continued)

Threatened and Endangered Plants Known, or Expected, to Occur in the Josephine Sustained Yield Unit[1]

Scientific Name	Confirmed Location	Status[2]
Thlaspi montanum var. Siskiyouense	Eight Dollar Mtn.; Cow Creek	T1
CARYOPHYLLACEA		
Arenaria paludicola	Unconfirmed	T1
CRASSULACEAE		
Sedum laxum heckneri	Onion & Fiddler Mtns.	T1
ERICACEAE		
Arctostaphylos intricata var. oblongifloia	nr. Waldo	T1
Vaccinium coccinium	Unconfirmed	T1
FABACEAE		
Astragalus applegatii	Unconfirmed	T1
A. purshii var. ophiocenes	Unconfirmed (species confirmed-variety unconfirmed)	E2,E3
Sophora leachiana	Josephine Co.	T1
FUMARIACEAE		
Dicentra formosa oregana	nr. Galice	E2,D3
Gentiana bisete	Illinois R.; Eight Dollar Mtn.	T1,T3
HYDROPHYLLACEAE		
Phacelia capitata	Unconfirmed	E2,E3
P. verna	Josephine County; Cow Creek	T1
LAMIACEAE		
Monardella purpurea	Rogue River; nr. Cave Jct. & Waldo	T1
LILLIACEAE		
Calochortus indecorus	Sexton Mtn.	E2,E3 (possibly extinct)
Erythronium howellii	Grasslands; nr. Cave Jct.	T1
E. oregonum	Unconfirmed	T1
Lilium accidentale	Unconfirmed	E2,E3
L. vollmeri	Unconfirmed (hillside bogs)	T1
L. wigginsii	Unconfirmed (hillside bogs)	T1
Lilium washingtonianum var. minus	Unconfirmed (variety unidentified)	T1

Refer to footnotes at end of Table.

Table 2- 12 (Continued)

Threatened and Endangered Plants known or Expected to Occur in the Josephine Sustained Yield Unit[1]

Scientific Name	Confirmed Location	Status[2]
Schoenolirion bracteosum	Bogs, Serpentine Soils; Eight Dollar Mtn.	T1
LIMNANTHACEAE		
Limnanthes gracilis gracilis	Unconfirmed (seeps)	T1
MALVACEA		
Sidalcea malvaeflora elegans	Deer Crk; nr. Applegate	T1
S. setosa	Unconfirmed	T1
ORCHIDACEAE		
Cypripedium californicum	Bogs; seeps, Eight Dollar Mtn.; nr. Cave Jct. Cow Creek	T1
PORTULACACEAE		
Lewis cotyledon	Whiskey Creek	T1
L. oppositifolia	Bogs; serpentine outcrops, Eight Dollar Mtn.; Illinois R.	T1
SARRACENIACEAE		
Darlingtonia california	Bogs; seeps; streams on serpentine	T1
SCROPHULARIACEAE		
Castilleja brevilobata	Eight Dollar Mtn; nr. Selma	T1
Pedicularis howellii Howell's pedicularis	Southern Josephine Co.	T1
Synthyris missurica hirsuta	Unconfirmed	E2,E3

1 Drawn from Lists published by U.S. Fish & Wildlife Service (Federal Register, 1975 & 1976) & the Oregon Threatened & Endangered Species Task Force (1976).

2 Status:
T1 - Listed as Threatened: USDI, FWS, 1975. Fed. Reg. 40 (127): 27828-27924.
E2 - Listed as endangered: USDI,FWS, 1976 Fed. Reg. 41 (117): 24524-24572
E3 - Considered endangered: Oregon Threatened and Endangered Species Task Force August, 1976.
D3 - Recommended for Deletion by Oregon Threatened and Endangered Species Task Force, August, 1976.

allow considerable faunal overlap, especially in animal populations with wide habitat tolerances.

Coniferous forests provide the most extensive terrestrial animal habitat in the JSYU. Although the dominant trees may differ between zones, conifer forests occur within all vegetation zones in the JSYU Habitat heterogeneity in existing forests is provided by local differences in the physical factors which influence plant community distribution as well as by natural disturbances (such as wildfire and logging) to the original forest community. These natural disturbances provide the conditions necessary for the establishment of seral plant communities, transitory communities which naturally succeed one another, eventually replacing the original, pre-disturbance forest community.

The occurrence of various successional stages in the existing coniferous forest in the JSYU is largely responsible for the diversity of animals there. Different animals may preferentially utilize different seral stages for reproduction, feeding or other life processes.

Tables 2-13 and 2-14 present lists of selected mammals and birds, respectively, of potential occurrence in the four major vegetation zones of the JSYU. Forest seral stages utilized are listed for each species. The assignment of the species to vegetation zones is based on studies in southwestern Oregon reported by Bailey (1936) and Browning (1975). The assignment of species to seral stages is based on studies conducted in the Blue Mountains of northeastern Oregon, reported by Thomas et al. (1977). The tables are by

Table 2-13

Some Mammals of the JSYU Listed
by Vegetation Zone and Seral Stage.*

MAMMAL SPECIES	Vegetation Zone: Interior valleys	Douglas Fir/ hardwoods	Mixed Conifer	White fir	Forest Seral Stage(s)** Utilized: Grass/forb	Shrub/seedling	Pole/sapling	Young 2nd growth	Mature	Old growth
Water Shrew				+	XO	XO	XO	XO	XO	XO
Coast mole		+	+		XO	XO	XO	XO	XO	XO
Long-eared Myotis		+	+		0	0	0	0	XO	XO
Big Brown Bat		+	+		0	0	0	0	XO	XO
Black-tailed Jackrabbit	+	+	+		XO	XO				
Snowshoe hare		+	+	+	0	XO	XO	XO	X	
Brush rabbit		+	+		0	XO	XO			
Beaver	+	+	+	+	XO	XO	XO	XO	XO	XO
Yellow-bellied Marmot		+	+	+	XO	XO				
Townsend's Chipmunk		+	+		XO	XO	XO	XO	XO	XO
Bobcat	+	+	+	+			XO	XO	XO	XO
Black Bear		+	+	+	0	XO	XO	XO	XO	XO
Coyote	+	+	+	+	XO	XO	XO	XO	XO	XO
Red Fox				+	XO	XO	XO	XO	XO	XO
+Racoon	+	+	+		0	0			0	0
+Marten		+	+	+			0	0	XO	XO
Spotted skunk	+				XO	XO	XO			
Badger	+	+	+		XO	XO	XO	XO	XO	XO
Cougar		+	+	+	0	XO	XO	XO	XO	
+ Silver gray Squirrel	X	X	X				XO	XO	XO	XO
Northern Flying Squirrel		X	X	X				XO	XO	XO
+ Western harvest Mouse	X	X	X		XO	XO	XO	XO	XO	XO
+ Deer Mouse	X	X	X		XO	XO	XO	XO	XO	XO
Bushy-tailed Wood rat		X	X		XO	XO	XO	XO	XO	XO
Muskrat		X	X		XO	XO	XO	XO	XO	XO
Mink		X	X		XO	XO	XO	XO	XO	XO
River otter		X	X		XO	XO	XO	XO	XO	XO
Roosevelt Elk	X	X	X		0	XO	XO	0	0	0
Black-tailed Deer	X	X	X		0	XO	XO	0	0	0

\+ Cavity users
* Adapted from Thomas et al. (1977) and Bailey (1936)

** Utilization Code: X = reproduction
0 = feeding

Table 2-14

Some Birds of the Josephine SYU Listed
by Vegetation Zone and Seral Stage

BIRDS SPECIES	Resident*	Transient**		Interior valleys	Douglas-fir/ hardwoods	Mixed conifer	White fir	grass/forb	shrub/seedling	pole/sapling	young second growth	mature	old growth
+Wood duck		M			+	+	+					X	X
Canada goose		M		+	+	+			XO	XO	XO	XO	
Goshawk	Y				+	+	+		0		0	XO	XO
Red-tailed Hawk	Y			+	+	+		0	0	0	XO	XO	XO
Golden eagle	Y			+	+	+	+	0	0	0	0	XO	XO
Bald Eagle	Y			+	+	+		0	0			XO	XO
Osprey	SF			+	+	+						X	X
Peregrine falcon		A		+	+	+		XO	XO	XO	XO	XO	XO
Prairie falcon		A		+				XO					
Blue Grouse	Y				+	+	+	0	XO	XO	0	0	0
Ruffed grouse	Y			+	+	+			XO	X	0	XO	XO
California quail	Y			+	+	+		0	XO	XO	XO		
Mountain quail	Y			+	+	+		0	XO	XO	XO		
Virginia rail	Y			+	+	+		XO	XO	XO	XO	XO	
Killdeer	Y			+	+	+	+	XO					
+Screech owl	Y				+	+		0	0		X	XO	XO
Great horned owl	Y			+	+	+		0	0	0	XO	XO	XO
+Spotted owl	Y				+	+	+					XO	XO
Pileated woodpecker	Y				+	+	+					XO	XO
Black backed 3 toed woodp'kr	Y						+				XO	XO	XO
+White-headed wood'pkr	Y				+	+						XO	XO
Willow flycatcher		S-SU	+	+					0	XO	XO		
Olive-sided flyc'tchr		S-F					+						
Violet-green swallow		S-F			+	+	+	0	0		X	X	XO
Cliff swallow		S-F		+	+	+		0	0	0	0	0	0
+Vaux's swift		SU										XO	XO
+Mountain chickadee		+			+	+	+			XO	XO	XO	XO
Pigmy nuthatch		S			+	+	+					XO	XO
+White-breasted nuthatch		Y					+					XO	XO
Dipper		Y			+	+	+	XO	XO	XO	XO	XO	XO
Winter wren		Y			+	+			XO	XO	XO	XO	XO
Swainson's thrush		SP SU			+	+	+						
+Western bluebird		Y				+	+	0	0		X	X	X
Ruby-crowned kinglet		Y				+	+			0	0	XO	XO
Cedar waxwing						+	+		XO	XO	XO	XO	
Solitary vireo		S-F			+	+				XO	XO	XO	XO
Nashville warbler		S-F				+	+			XO	0	0	
Townsend's warbler			M		+	+					0	XO	XO
Hermit warbler		S-SU					+						
House sparrow		Y		+				0	0		X	X	X
Brewer's blackbird		Y		+				0	XO	XO	XO	XO	XO
Western Tanager		S-F			+	+			0	0	XO	XO	XO
Purple finch		Y			+	+		0	0	XO	XO	XO	XO
House finch		Y		+				0	0	0	XO	XO	0
Rufous-sided Towhee		Y			+	+			XO	XO	XO	XO	XO
Savana sparrow		Y		+				XO	X				
Dark-eyed junco		Y		+	+	+		XO	XO	XO	XO	XO	XO
White-crowned sparrow		Y		+	+	+		XO	XO	XO	XO	XO	XO
Fox sparrow		Y			+	+			XO	XO	XO	XO	
Song sparrow		Y		+					XO	XO	XO	XO	

* Resident Status: S = spring, SU = summer, F = fall, W = winter, Y = year long

** Transient Status: M = migrant (fall & spring), A = accidental

*** Utilization Codes: X = reproduction, O = feeding

Source: Adapted from Browning (1975) and Thomas et al., (1977).

no means complete listings of all the animals in the area, nor are the animals considered to be restricted to any category unless otherwise noted.

Twenty-two species of reptiles and amphibians are known to occur in the JSYU. It is impossible to assign most of these species to vegetation zones because of the inadequacy of available data.

Game Animals

Mammals

The Oregon Wildlife Code (1976) lists the black bear, cougar, deer, elk, mountain goat, mountain sheep, and silver gray squirrel as game mammals.

Black-Tailed Deer. The black-tailed deer is distributed throughout the Medford District, wherever habitat conditions are suitable. All lands within the sustained yield unit are considered to be deer habitat or potential habitat except for those lands in roads, homesites or cities.

Deer in this area do not migrate latitudinally but move between summer (higher altitude) ranges and winter (lower altitude) ranges. Summer range in the SYU lies above about 2500 feet and winter range below it. Lands below 1500 feet elevation are considered year-long deer habitat. Scattered public lands at these lower altitudes serve as seclusion areas for deer amid private land developments and increased human activities. Winter range and year-long

range are limited within the area, whereas summer range is fairly abundant (Figure 2-12).

Crucial winter range is confined to valley bottoms. This range is considered crucial because it is vital for the deer herd and is being steadily diminished by human activity. Highest winter deer densities are on southwest slopes because of increased sunlight, highly palatable and nutritious forage, and light snowpack. Consequently many of these areas are severely over-utilized.

Food, water and cover are good to excellent over most of the area. Human intrusions such as extensive road networks, residential development and recent timber harvests reduce hiding cover and may form barriers that prevent deer movements between desirable habitats.

Black-tailed deer populations in the SYU have declined within recent years. The severe winter of 1968-1969 caused considerable mortality in a short time. Habitat modifications, such as fire control, road construction, improved silvicultural systems and changing private land use patterns, undoubtedly have a greater combined effect on the decline of the deer population over a long time. These factors, however, create problems that are difficult to assess quantitatively over short periods of time and are generally less obvious than mortality caused by phenomena like unusually severe weather.

The Oregon Department of Fish and Wildlife estimates that the deer population of southwestern Oregon declined in 1975 by about 20 per cent below

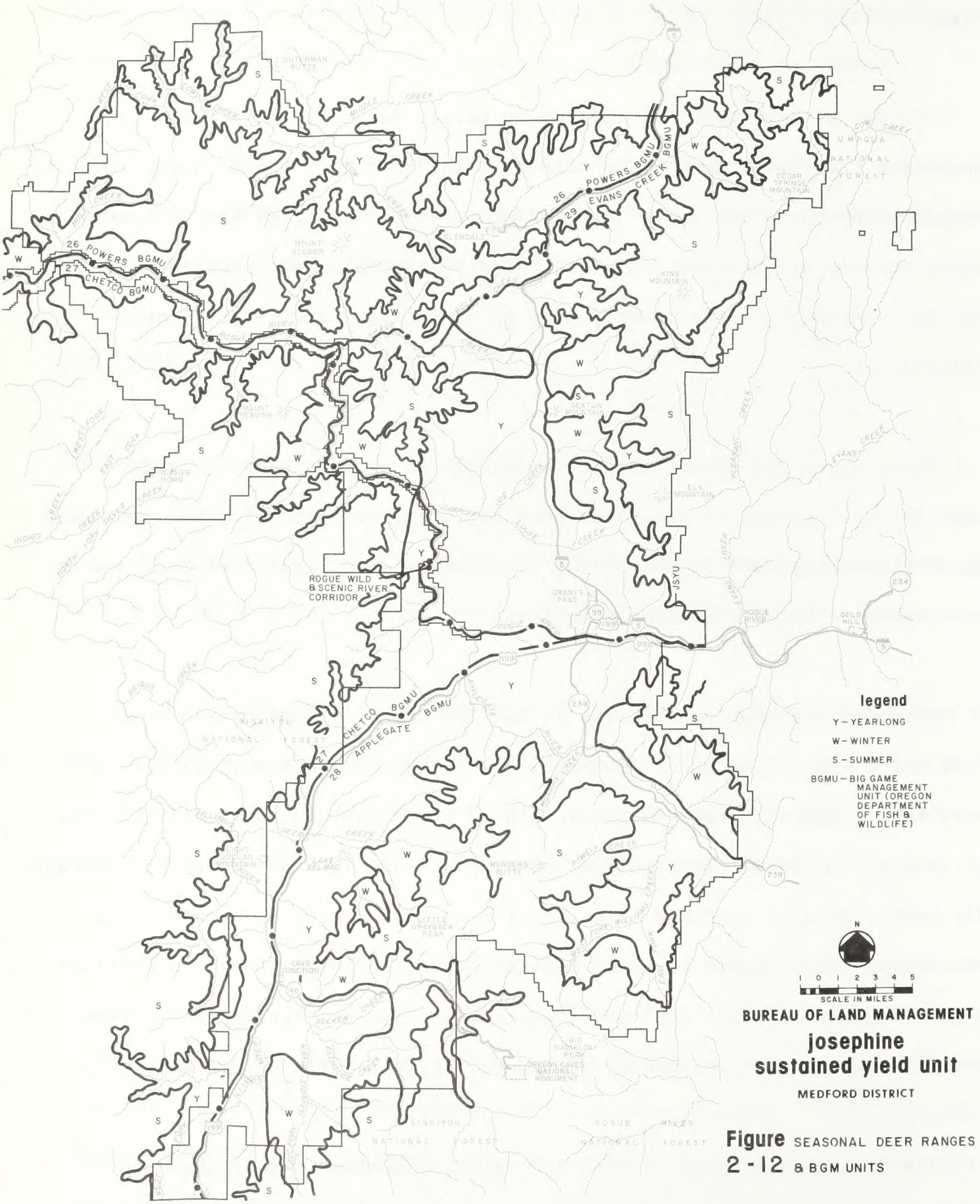


Figure 2-12 SEASONAL DEER RANGES & BGM UNITS

the ten-year average (Figure 2-13). Among that department's "Big Game Management Units" (BGMU), shown in Figure 2-12, the Chetco BGMU, Evans Creek and the Josephine County portion of the Applegate should be fairly representative of the JSYU. Portions of the Powers BGMU fall within the Josephine unit but are not felt to be representative of the area as a whole.

Analysis of the population trends in the three applicable Big Game Management Units (Chetco, Evans Creek and West Applegate) shows that the estimated deer population decreased by about eighteen per cent below the ten-year average in 1975-76. Population trends for each of the three applicable Big Game Management Units are shown in Figure 2-14.

Roosevelt Elk. Roosevelt elk probably ranged throughout most of the Coast and Klamath Mountain provinces in the historic past. However, it is unlikely that populations were ever very large. In 1910 the Forest Service reported elk were scarce in the Siskiyou National Forest: 26 elk in 1926 and 40 in 1932 (Bailey, 1936).

Published trend data are not available for the elk population within the Josephine SYU, but it is known that the population is small in comparison to the deer population. In 1965, in an effort to meet the increasing demands of elk hunters, the Medford District Office of the BLM officially asked the Oregon State Game Commission (now Oregon Department of Fish and Wildlife) to relocate some elk into the district. The state agency brought 21 elk into the Horse Creek - Peavine Mountain area (1967), thirteen elk into the Taylor Ridge

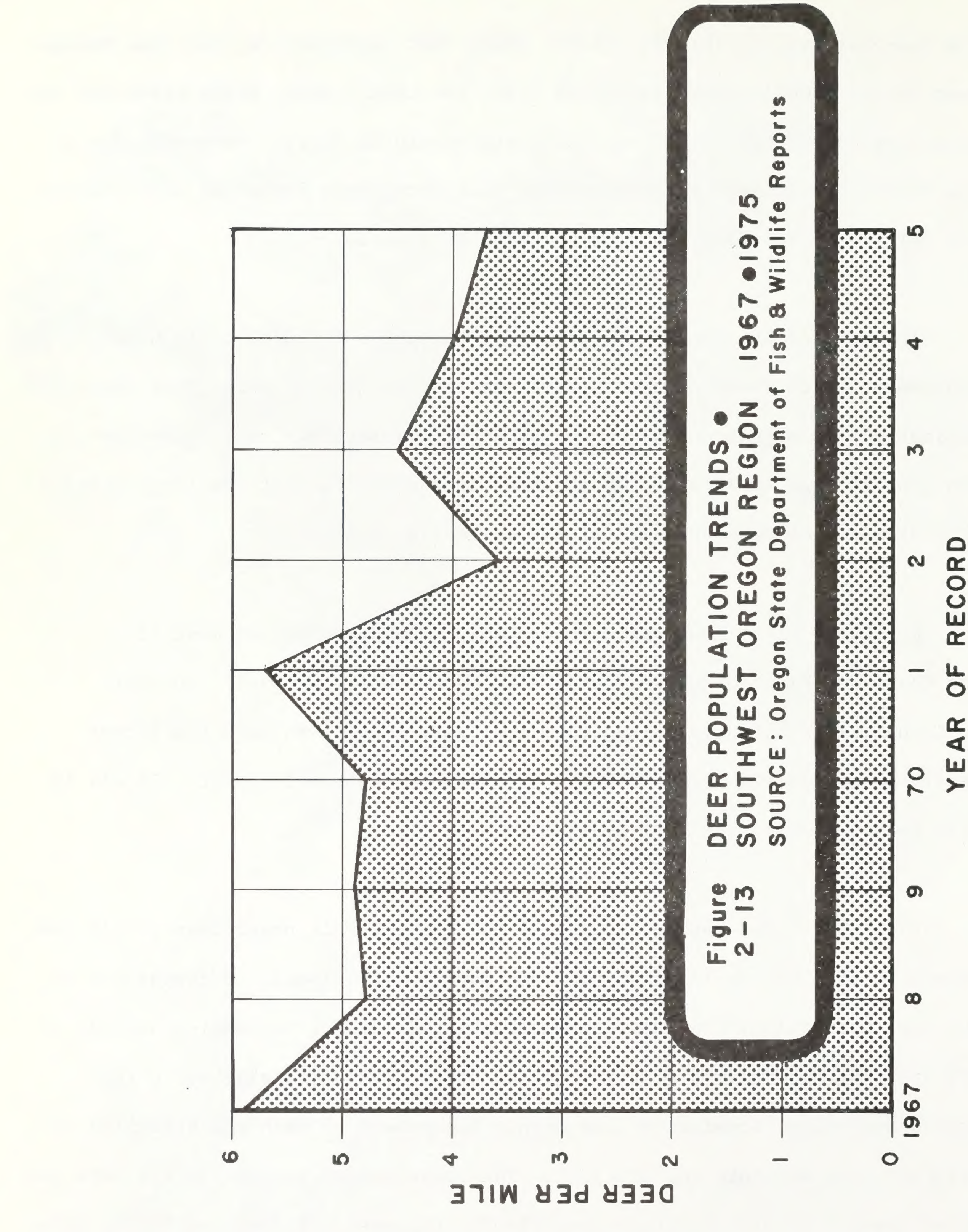


Figure 2-13 DEER POPULATION TRENDS • SOUTHWEST OREGON REGION 1967 • 1975
SOURCE: Oregon State Department of Fish & Wildlife Reports

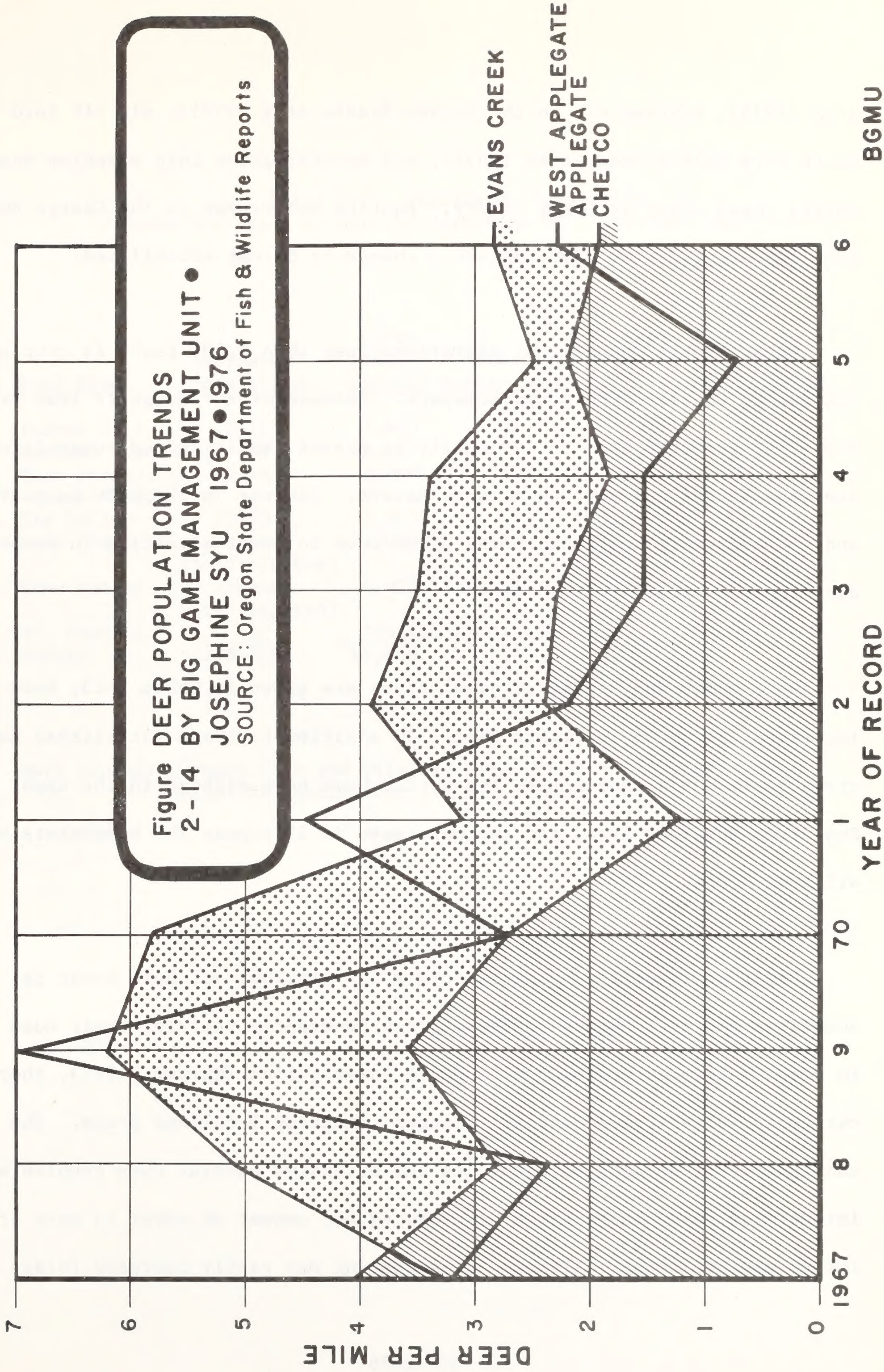


Figure 2-14 DEER POPULATION TRENDS BY BIG GAME MANAGEMENT UNIT • JOSEPHINE SYU 1967•1976
SOURCE: Oregon State Department of Fish & Wildlife Reports

area (1975), sixteen elk in the Hansen Saddle area (1975), six elk into the South Fork Galice Creek area (1975), and another group into a region near Shasta Coast Creek in Curry County. Hunting was banned in the Chetco BGMU from 1967 to 1974, to give the elk a chance to become established.

Winter range, usually at elevations less than 2,500 feet, is crucial to elk during winters with heavy snowpack. Because winter range is less extensive than summer range, it is usually in poorer condition and competition with deer and domestic livestock is more severe. Elk use in the JSYU is year-long and non-migratory, although herds often move to lower elevation in response to deep snows in winter.

Herd names and estimated populations are given in Table 2-15; herd locations are shown in Figure 2-15. In addition to these established herds, other small herds roam in the area. Elk have been sighted in the upper Bull Run-Green Mountain Area, and two were seen in 1976 near the headwaters of Williams Creek.

Water availability is satisfactory for elk, but adequate cover is sometimes scarce. Because Roosevelt elk inherently restrict their home ranges to areas seldom exceeding two to three square miles (Harper, 1971), they are extremely vulnerable to habitat changes involving localized areas. The combination of successive clearcuts and extensive partial cuts coupled with intensified road construction has reduced the amount of cover in many preferred elk use areas. Although clearcutting may vastly increase forage

Table 2-15. Estimated Populations of Known Elk Herds within the Josephine SYU (See also Figure 2-15)

Herd Name	Estimated Population	Total Range (acres)	Per cent Public Lands	Winter Range (acres)	Per cent Public Lands
Beacon Hill	12-15	7,840	35	1,080	19
Fortune Branch	22	13,000	31	1,789	27
Bear Creek-Buck Ridge	13-14	3,000	50	1,790	54
Elk Valley	75-80	21,000	49	16,040	44
Mule Creek	unknown (6-12 sighted)	17,000	92	10,280	90
Eden Valley	unknown (45 sighted)	4,000	88	880	56
Mt. Peavine	30	Insufficient data			
TOTALS	203-218	65,840		31,859	

Main Source: Oregon Fish and Wildlife Plan, Wildlife Section, Oregon Wildlife Commission, 1974. Fed. Aid. Project FWO/R.

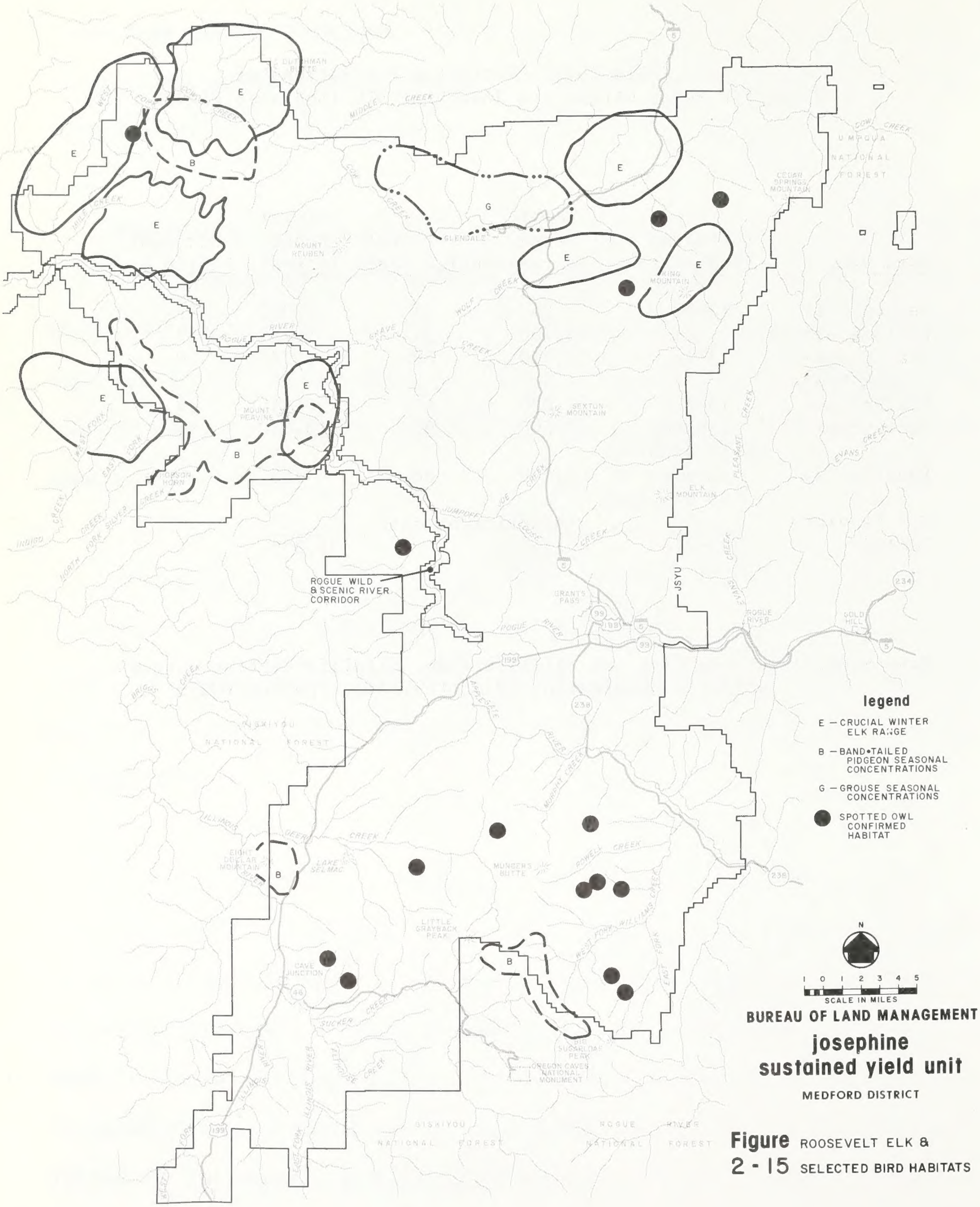


Figure 2 - 15 ROOSEVELT ELK & SELECTED BIRD HABITATS

abundance, it is necessary for elk to have the protection offered by dense cover closely adjacent to the clearcut.

Black Bear. Black bears are found throughout the Josephine SYU, and their population appears to be stable or slightly on the increase, although no population trend data is available for the unit. Harvest regulations are probably the main factor for keeping the population stable. The recent classification of bears as game animals by the State Department of Fish and Wildlife (1970 in the Powers & Evans Creek BGMU's; 1968 in the Chetco BGMU; 1967 in the Applegate Unit) has eliminated the continuous incidental harvest of bear throughout the year. Lands within one mile of the Rogue River between Grave and Lobster Creeks have been closed to bear hunting. This "refuge" area is excellent bear country and provides a center of expansion for the bear population. Habitat conditions over most of the SYU are considered good to excellent.

In 1970 the State Department of Fish and Game estimated a population of approximately 1180 bears in Josephine County. The 1971 Rogue River Fish and Wildlife Plan estimated that the Rogue Canyon supports 700 to 750 bears. The steep, rocky cliffs above the Rogue provide excellent denning areas, and the roadless region in the "wild section" of the river complements the natural bear habitat.

Mountain Lion (Cougar). The mountain lion is the top carnivore in the Josephine Sustained Yield Unit. These large cats are very secretive and are

seldom seen by sportsmen or casual observers. Prior to 1968 the mountain lion was classified as a predator, a classification that allowed unregulated hunting at all seasons. Since that time the cougar has been given game animal status, which allows hunting to be regulated for the benefit of the species. The Oregon Department of Fish and Wildlife estimated (1974) that there were approximately 660 cougars in Josephine County in 1970. The cougar population in the Rogue Canyon was estimated at approximately fifteen animals (ODF&W, 1971). The cougar population appears to be stable or slightly increasing in southwestern Oregon (Gale, 1973), a trend that may be attributed largely to its designation as a game animal.

The cougar is a resident of the inaccessible mountainous forests of the area and is usually closely associated with elk or deer herds. Elk and deer are a major portion of the predator's diet. High quality cougar habitat is restricted to the few unroaded areas along the Rogue River and its drainages or other comparable regions within the SYU.

No recent data are available on population trends within the SYU. One cougar was killed in the Pickett Creek area in November, 1975, and poaching probably occurs sporadically throughout the year.

Silver Gray Squirrel. The silver gray squirrel is found throughout the Josephine SYU, with highest population in the mixed conifer forest. These squirrels are especially abundant in the serpentine area of Mt. Peavine, the Whiskey Creek-Mt. Reuben area and the low foothills of the Illinois Valley.

All habitat components are present within the unit in sufficient quantity to permit this squirrel to increase its populations. Little data is available on population trends, but field observations indicate that the population is stable.

Birds

Upland Game Birds. Upland game birds include quail, grouse, dove and pigeon.

Mountain Quail. The mountain quail is a non-migratory resident found throughout the Josephine unit in mountainous regions. Brushy openings in forested areas are preferred habitat. These quail forage in the edges of clearcuts, especially during summer and fall when fruits are ripening. Mountain quail are abundant in the upper Cow Creek drainages, Deer Creek and Williams Creek regions and the Mt. Peavine - Rum Creek area. During periods of snow cover, mountain quail are forced to lower elevations and compete for food with California quail.

Population trend data, collected along big game census routes by the State Department of Fish and Wildlife (Rogue District), indicated a population density of 2.23 mountain quail per census mile in 1975. In 1974 the estimated population was 1.05 per mile (ODF&W, 1975).

Blue Grouse. Blue grouse are the more common and widespread grouse in the unit. They are non-migratory and are seasonally associated

with the higher elevation white fir community and with clearcut stands. Clearcuts are utilized primarily during late summer and autumn when ripe fruits are available. Basic habitat components for these grouse appear to be adequate in the unit.

The 1975 road census conducted by Oregon Department of Fish and Wildlife showed an average of .11 blue grouse per mile in the southwestern region of Oregon, an increase of .05 over 1974.

Oregon Ruffed Grouse. The ruffed grouse is a year-round resident of the mixed evergreen, deciduous and riparian forests. Preferred habitat is meadow areas intermingled with forests. The population of the SYU is low and fluctuates widely every year, as do populations of other species of grouse.

The amount of suitable habitat is adequate within the SYU and could probably support a greater population of this species. There are no known population concentrations in the unit.

Band-Tailed Pigeon. Band-tailed pigeons, the only wild pigeon native to Oregon, may occasionally be found in autumn within the forests of the Josephine SYU. Some nesting may occur in the region but most nesting activity occurs west of the SYU in the Coastal Forest region of the state. Clearcut units and fruit-producing hardwood areas located near ridge passes are heavily utilized by pigeons, especially during migrations.

No local population concentrations of pigeons are known within the Josephine unit. Data collected by ODF&W (1975) at Mineral Springs and tide-flat concentration areas, outside the Josephine Unit, show a 39 per cent increase in the pigeon population since 1974.

Furbearers

The Oregon wildlife code lists the beaver, fisher, marten, mink, river otter, raccoon and bobcat as furbearers in the State. Annual trapping records furnish excellent information on the distribution of these animals. However, this data cannot be applied in determining population trends because high fur prices increase trapping effort while a depressed market generally decreases effort.

In addition to those animals officially listed as furbearers by the State, the coyote, red fox, skunks and muskrat are valued for their fur. These animals are unprotected by official trapping regulations. Recent increases in fur prices have brought about an associated increase in trapping efforts for all furbearing species.

Non-Game Animals

Data regarding the status of non-game animal populations are insufficient to allow analyses of their populations to the same depth that is possible for game species. It can be stated however, that existing animal populations

(both game and non-game species) reflect the dramatic changes that have occurred within the Josephine SYU since civilization moved to western Oregon.

Animals that are unable to tolerate human intrusion or that are dependent on climax or old growth vegetational communities, have generally declined as man has increased his presence in the environment. Examples of species which exhibit this type of population trend are the northern spotted owl, wolverine and timber wolf.

Species that are more tolerant of human intrusion or are flexible in regard to habitat preference have been better able to adapt to changes in their environment. Existing populations of these species are expected to be stable. Tables 2-13 and 2-14 display some non-game animals by vegetation zone and seral stage.

Other animal populations may flourish in close association with man. These species established new populations in the area or expanded their populations with the coming of man. Existing populations of this type include the starling, house sparrow, coyote, house mouse and Norway rat. Populations of these species are probably expanding.

Endangered Species

One bird species of potential occurrence in the SYU is listed as endangered by the most recent U.S. Fish and Wildlife Service list (1976). This

species, the peregrine falcon, is afforded strict protection under the law. It is unlawful, except under permit, to take such species within the United States. "Take" is defined by the Endangered Species Act (1976) as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct."

In addition to the peregrine falcon, three other species of animals of potential occurrence in the unit are listed as threatened with endangerment by the U.S. Fish and Wildlife Service (1973) or state organizations (Oregon Endangered Species Task Force; Oregon Department of Fish and Wildlife). All known rare or endangered animals of possible occurrence in the unit are listed in Table 2-16.

The northern bald eagle is a summer resident and winter visitor in the unit. These birds are usually associated with large bodies of water such as the Rogue River or various lakes. A joint effort by the Oregon Department of Fish and Wildlife, BLM and Forest Service in 1970 identified several large nests, presumed to be eagle nests, in the unit.

Table 2-16

Animals of Potential Occurrence in the Josephine SYU
Classified as Endangered or Threatened.

Species	Classification 1/	List 2/
Peregrine Falcon	E	U.S.; Oregon
Northern Bald Eagle	T	Oregon; (Proposed-U.S.)
Northern Spotted Owl	T	Oregon; (SU in U.S.)

1/ E = endangered; T = threatened with endangerment

2/ U.S. list includes official Endangered and Threatened Species list, plus and unofficial Status Undetermined list compiled by the U.S. Fish and Wildlife Service. Oregon list includes official State list of threatened or endangered species and a list of species unofficially classified as "status undetermined" (SU) by the Oregon Endangered Species Task Force.

The peregrine falcon is an uncommon resident in the unit. They may fly over public lands in the Rogue River Canyon, although there have been no recent sightings and no confirmed nests have been reported. Steep bluffs and cliffs along the Rogue River should provide suitable nesting habitat.

The northern spotted owl ("threatened" in 1973 U.S. Fish and Wildlife List; "threatened" in 1975 ODF&W list; unlisted in the 1976 U.S. Fish and Wildlife List) is a year-long resident in the unit. Although the owl is not included on the official U.S. list of endangered species, it has received a great deal of interest from the BLM, USFS, and other agencies because data

indicate that it is dependent on old growth forests. Specifically, the spotted owl nests in large, standing trees with broken tops ("snags"). Suitable nest trees are located only in old growth forests and old growth forests are rapidly disappearing. Therefore, as nesting habitat declines the future of the spotted owl will be in jeopardy unless adequate protective measures are taken. Areas of confirmed spotted owl habitat are shown in Figure 2-15.

Seventeen additional species which may occur in the JSYU have been identified by either the Federal or State investigatory agency as "Status Undetermined". Status undetermined indicates that additional information is sought on species, populations, and area of occurrence. Such classification is often a preliminary stage to placement on an endangered or threatened list. The seventeen species of undetermined status are listed in Table 2-17.

The American osprey ("status undetermined" 1973 USFWS list) is a summer resident in the unit and feeds primarily on fish from the Rogue River and its tributaries. Inventories conducted along the Rogue by BLM and USFS during the past 10 years indicate that the local osprey population is stable. No nests have been confirmed but the birds have been observed flying over the area.

Fishes

The aquatic habitats of the Josephine SYU support diverse populations of game and non-game fish species. Cold water anadromous fishes (fishes that are

Table 2-17

Animals of Potential Occurrence in the Josephine Sustained Yield Unit Classified as "Status Undetermined"

Species	List 1/
American Osprey	U.S.
Burrowing Owl	U.S.; Oregon
California Mountain King Snake	Oregon
Common King Snake	Oregon
Ferruginous Hawk	U.S.; Oregon
Fisher	U.S.; Oregon
Flammulated Owl	Oregon
Goshawk	Oregon
Pigeon Hawk (Merlin)	Oregon
Pileated Woodpecker	Oregon
Pine Marten	U.S.; Oregon
Red Fox	Oregon
Ringtail Cat	Oregon
Sharp-Shinned Hawk	Oregon
Swainson's Hawk	Oregon
Tailed Frog	Oregon
White-Headed Woodpecker	Oregon

1/ Oregon list includes official State list of threatened or endangered species and a list of species unofficially classified as "status undetermined" by the Oregon Endangered Species Task Force.

U.S. list includes official Endangered and Threatened Species list, plus an unofficial Status Undetermined list compiled by the U.S. Fish and Wildlife Service. Oregon list includes official State list of threatened or endangered species and a list of species unofficially classified as "status undetermined" by the Oregon Endangered Species Task Force.

No information is available pertinent to other rare or endangered species of wildlife of potential occurrence within the unit.

reared in fresh water, migrate to the ocean and return to fresh water to spawn) are especially well represented with six species. Two species of cold water resident game fish and four species of warm water game species are also represented in the area. Ten species of non-game fish have been identified in the unit (see Table 2-18). No endangered species of fish are known to occur in the unit.

Approximately 202 miles of Class I and 188 miles of Class II streams of direct importance to fisheries flow through public lands in the Josephine SYU. "Class I streams" are defined by the State of Oregon as waters which are valuable for domestic use, are important for angling or other recreation and/or are used by significant numbers of fish for spawning, rearing or migration routes. Streamflows in Class I streams may be either perennial or intermittent.

"Class II streams" are defined as any headwater streams or minor drainages that generally have limited or no direct value for angling or other recreation. They are used by few, if any, fish for spawning or rearing. The principal value of Class II streams lies in their influence on water quality or quantity in Class I waters downstream. Figure 2-16 shows locations of Class I stream habitats.

Cold Water Game Fishes

Both anadromous and resident species are considered cold water game fishes.

Table 2- 18

Fishes Identified in the Josephine SYU

I. Game Fish

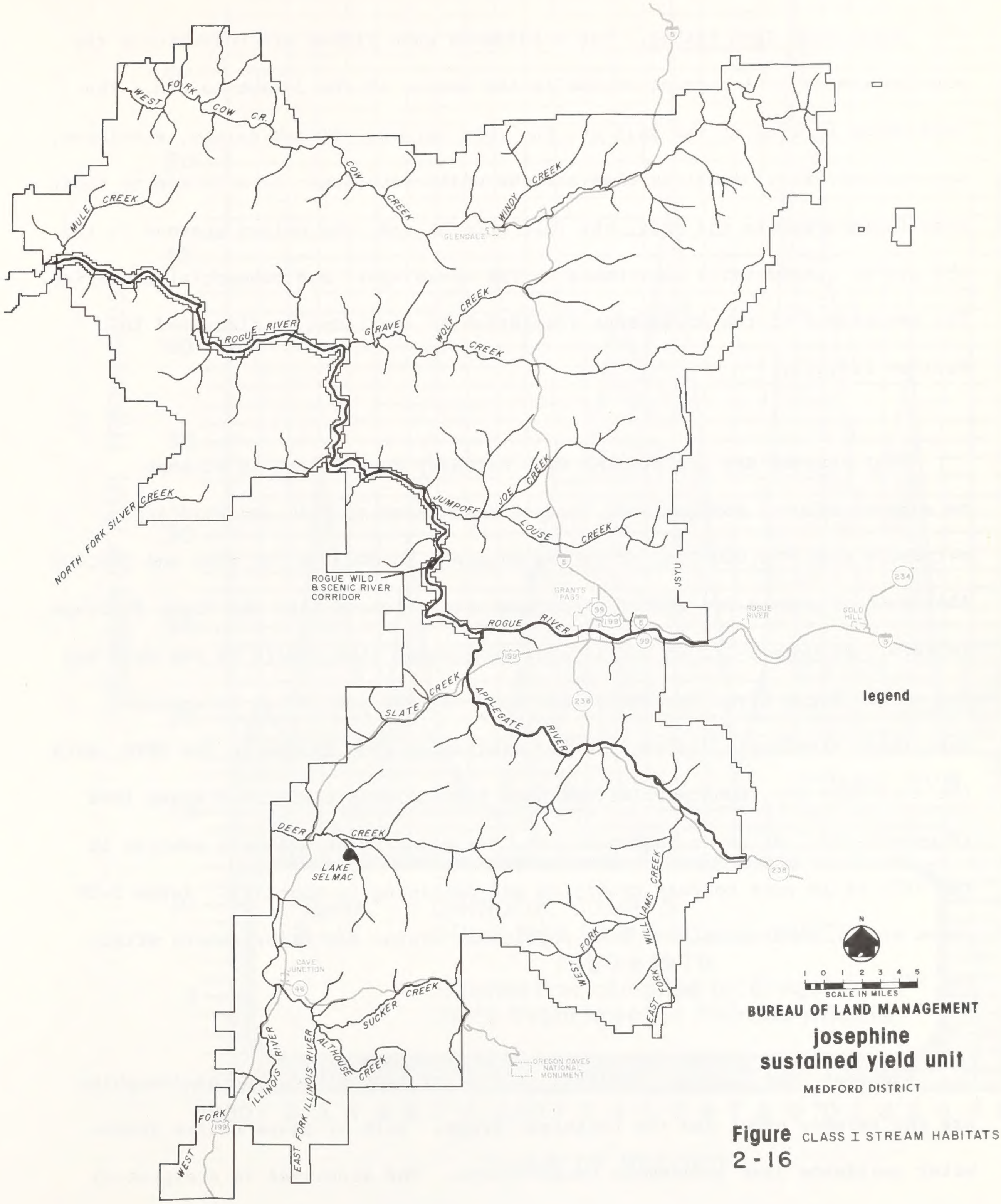
A. Cold Water Anadromous
- Summer steelhead
- Winter steelhead
- Spring chinook salmon
- Fall chinook salmon
- Coho salmon
- Sea-run cutthroat trout
- American shad
- White sturgeon
- Green sturgeon

B. Cold Water Resident
- Rainbow trout
- Resident cutthroat trout

C. Warm Water Resident
- Brown bullhead catfish
- Largemouth bass
- Black crappie
- Bluegill

II. Non-Game Fish
- Pacific lamprey 1/
- Carp
- Redside shiner
- Blackside dace
- Squawfish 2/
- Klamath small scale sucker
- Coastrange sculpin
- Prickly sculpin
- Reticulate sculpin
- Threespine stickleback

1/ Lamprey are not true fishes.
2/ Not found in the Rogue Drainage



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

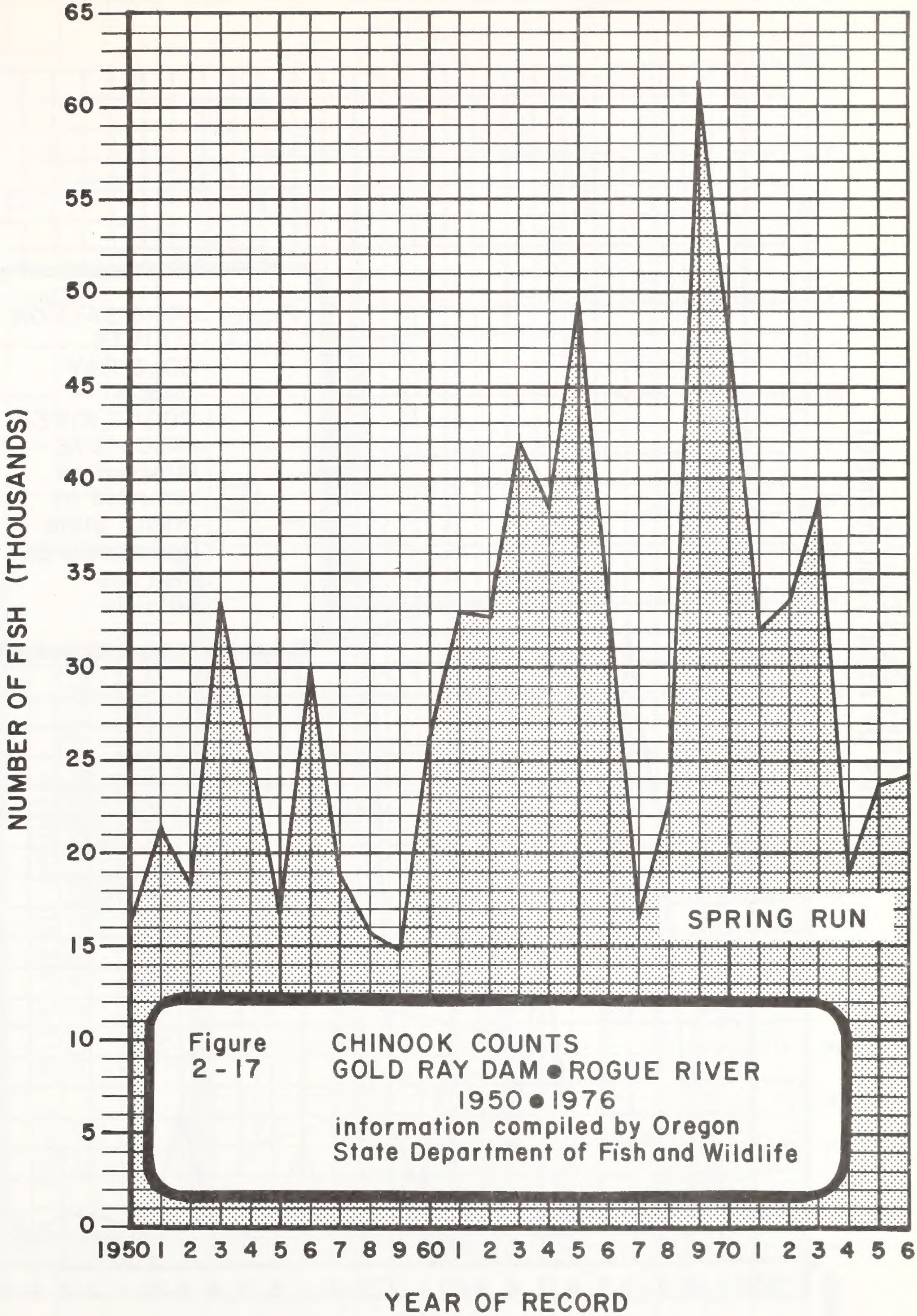
MEDFORD DISTRICT

Figure 2-16 CLASS I STREAM HABITATS

Anadromous Game Fishes. The anadromous game fishes are undoubtedly the most economically important fishes in the waters of the Josephine SYU. The anadromous species of the unit are the coho salmon, chinook salmon, steelhead, sea-run cutthroat, American shad and the white sturgeon. In addition to their significance within the unit, the fall chinook and coho salmon spawned in the SYU are of considerable importance to the ocean sport and commercial fisheries. The importance of the anadromous population to sportsmen is discussed in Section 2.1.3.1.

Many streams are now stocked with hatchery-raised fish in attempt to augment natural populations. Oregon Department of Fish and Wildlife estimates that 800,000 lbs. of spring chinook, 20,000 lbs. of coho and 150,000 lbs. each of summer and winter steelhead were released into the Rogue drainage in 1975. Figures 2-17, 18 and 19 show anadromous fish counts at the Gold Ray Dam on the Rogue River for every year between 1950 and 1976. No apparent population trends are discernible for anadromous game fishes in the JSYU, with the exception that coho populations have considerably diminished since 1964 (Figure 2-18). As shown in Table 2-19, the majority of salmonid habitat in the JSYU is in poor to fair condition and declining in quantity. Table 2-20 shows annual anadromous game fish population status for major waters within the SYU.

Resident Game Fishes. Resident cold water game fishes in the Josephine are the rainbow trout and the cutthroat trout. Both of these native fresh-water residents have anadromous counterparts. The steelhead is a migratory


NUMBER OF FISH (THOUSANDS)
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1950 1 2 3 4 5 6 7 8 9 60 1 2 3 4 5 6 7 8 9 70 1 2 3 4 5 6
YEAR OF RECORD
SPRING RUN
Figure 2-17
CHINOOK COUNTS
GOLD RAY DAM • ROGUE RIVER
1950 • 1976
information compiled by Oregon State Department of Fish and Wildlife

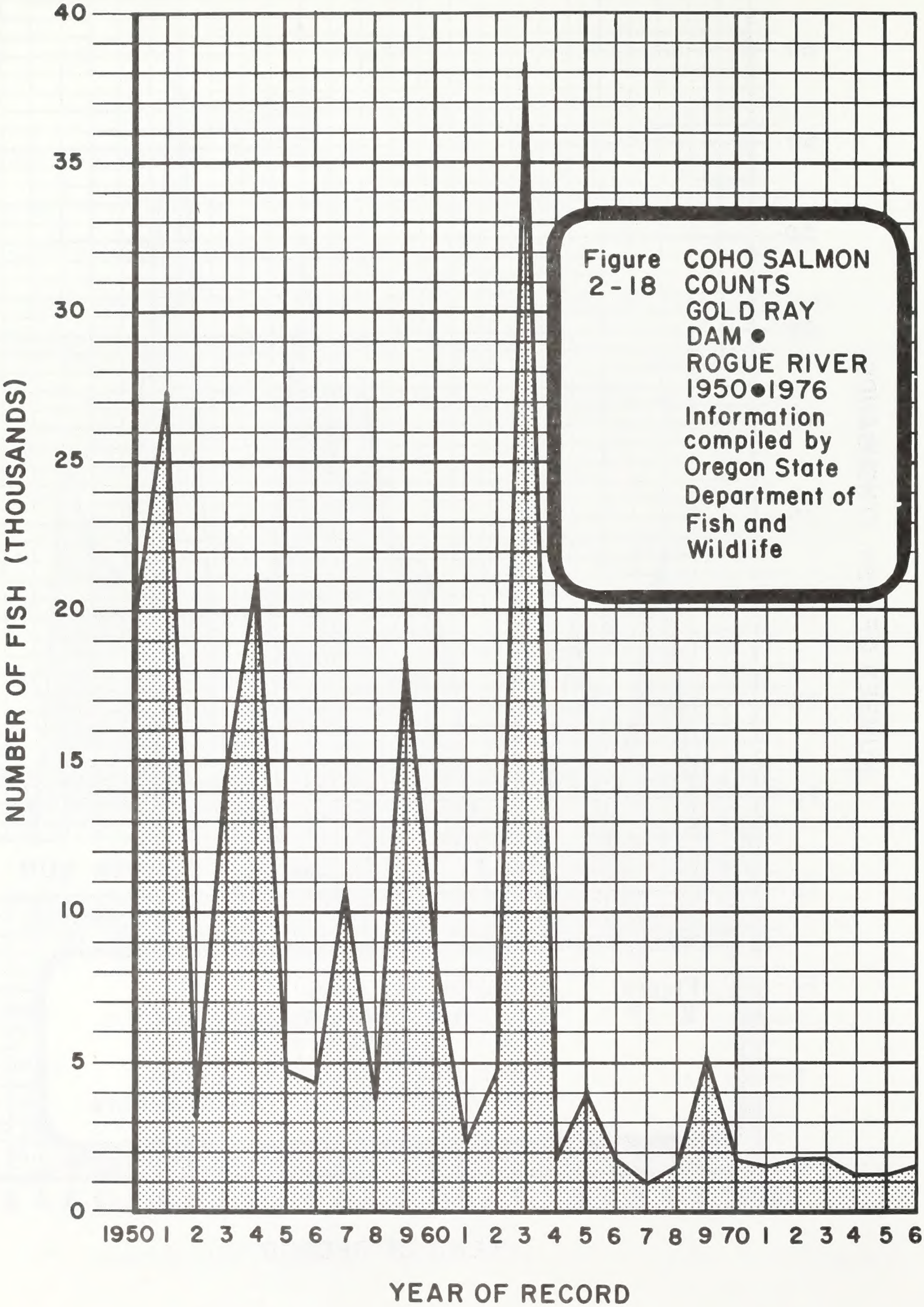


Figure 2-18 COHO SALMON COUNTS GOLD RAY DAM • ROGUE RIVER 1950•1976
Information compiled by Oregon State Department of Fish and Wildlife
NUMBER OF FISH (THOUSANDS)
40
35
30
25
20
15
10
5
0
1950 1 2 3 4 5 6 7 8 9 60 1 2 3 4 5 6 7 8 9 70 1 2 3 4 5 6
YEAR OF RECORD

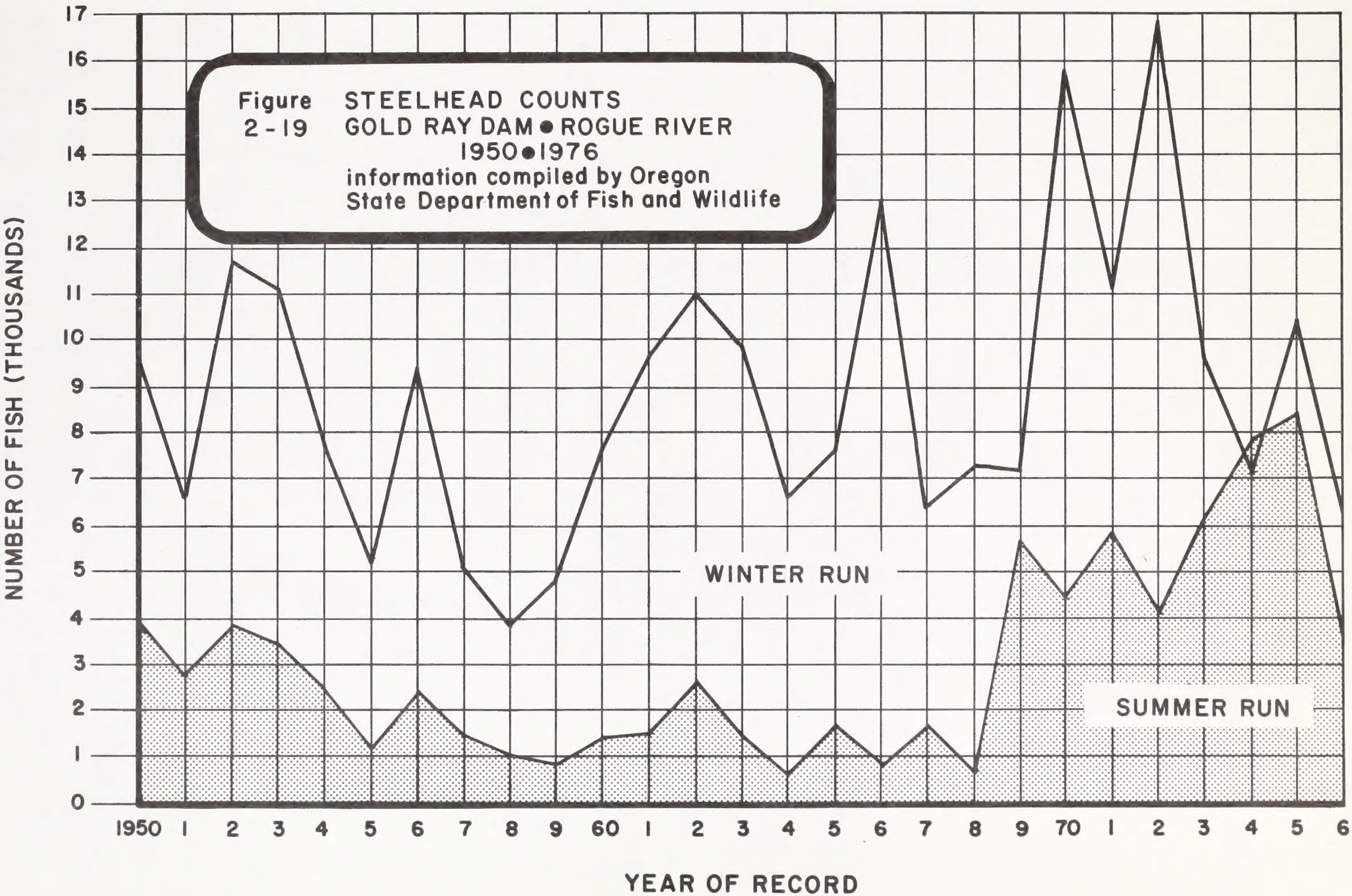


Figure 2-19 STEELHEAD COUNTS
GOLD RAY DAM ● ROGUE RIVER
1950 ● 1976
information compiled by Oregon
State Department of Fish and Wildlife
WINTER RUN
SUMMER RUN
NUMBER OF FISH (THOUSANDS)
YEAR OF RECORD
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
1950
1
2
3
4
5
6
7
8
9
60
1
2
3
4
5
6
7
8
9
70
1
2
3
4
5
6

Table 2-19
Salmonid Fish Species Habitat and Current Status
Josephine SYU

Species	Habitat Type	Stream Miles 1/ (Total)	(Public)	Habitat (quality)	Status 2/ (quantity)
	adult migration	216.5	76.7	fair	stable
Summer	spawning	135.7	42.2	fair	decreasing
Steelhead	rearing	193.1	76.7	poor	decreasing
	juvenile migration	216.5	76.7	poor	decreasing
	adult migration	450.7	114.2	good	stable
Winter	spawning	435	112.2	fair	decreasing
Steelhead	rearing	339	107	poor	decreasing
	juvenile migration	418	112	poor	decreasing
	adult migration	59	34.5	poor	decreasing
Spring	spawning	6	0	fair	stable
Chinook	rearing	6	0	fair	stable
Salmon	juvenile migration	59	34.5	good	stable
	adult migration	178	54	fair	stable
Fall	spawning	178	54	fair	stable
Chinook	rearing	56	8	poor	decreasing
Salmon	juvenile migration	178	54	fair	stable
	adult migration	376	95	good	stable
Coho	spawning	376	95	good	stable
Salmon	rearing	301	114	poor	decreasing
	juvenile migration	376	114	poor	decreasing
	adult migration	451	114	good	stable
Sea-run	spawning	382	78	fair	decreasing
Cutthroat	rearing	339	107	poor	decreasing
	juvenile migration	418	112	poor	decreasing
Resident	spawning	574	185	fair	decreasing
Cutthroat	rearing	332	150	fair	decreasing
Resident	spawning	339	77	fair	decreasing
Rainbow	rearing	356	167	fair	decreasing

1/ Class I stream environment
2/ Based on 1965-75

Table 2-20
Anadromous Game Fish Population Status

Stream Section	Species	Status
Rogue River (Mouth of Applegate River to Savage Rapids Dam)	Spring chinook	stable
	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	stable
	Winter steelhead	stable
Rogue River and tributaries from Mule Creek to Applegate River	Spring chinook	decreasing
	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	stable
	Winter steelhead	stable
	Sturgeons	stable
Rogue River and tributaries from Applegate River to Upper Limits of anadromous fish (Not including Applegate River drainage)	Spring chinook	decreasing
	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	stable
	Winter steelhead	stable
*Rogue River (northside tributaries--Marial to Grave Creek)	Summer steelhead	stable
		stable
*Umpqua River (Cow Creek and tributaries--West Fork to Anchor)	Fall chinook	decreasing
	Coho	decreasing
	Winter steelhead	stable
Illinois River Drainage (inside Resource Area)	Fall Chinook	stable
	Coho	
	Winter Steelhead	stable
Applegate River Drainage (inside SYU)	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	decreasing
	Winter steelhead	decreasing

* Closed to angling by Oregon Department of Fish & Wildlife due to stream's importance as spawning bed.
Source: Oregon Department of Fish and Wildlife estimates

rainbow trout whereas the sea-run cutthroat is an anadromous form of the native cutthroat.

Freshwater habitat requirements are basically the same for both species, including their anadromous counterparts. The main morphological difference between natives and sea-runs is that the sea-runs attain larger sizes. Because native resident salmonids do not require the salt water habitat, virtually all perennial streams in the SYU can be considered potential habitat.

Both species are abundant in the main stem of Cow Creek and in practically all headwaters of tributary streams in the area. While their range overlaps that of steelhead and salmon in many streams, native resident populations are found predominantly upstream of their anadromous counterparts. As with anadromous forms, resident salmonids are very intolerant of habitat changes. The ODFW stocks the Rogue drainage annually with about 93,000 rainbow and cutthroats. Resident trout populations are considered stable in all JSYU waters except the Applegate River, where they are declining.

Warm Water Game Fishes

Populations of largemouth bass, bluegill, pumpkinseed sunfish, green sunfish, brown bullhead and black crappie are restricted to sloughs and reservoirs within the Josephine unit. None of these species is indigenous to western Oregon; all have been introduced as game fish. Whereas trout and salmon prefer cold, fast-moving waters, warm water species prefer quiet, warm

waters. Neither group can thrive in the other's habitat. Areas such as dredge ponds or river sloughs resulting from old mine or gravel operations provide the main source of habitat for warm water fishes on public lands within the unit. These species have not increased their abundance significantly because suitable habitat is limited.

A few private ponds and river sloughs in the area have good populations but angler use is not known.

Non-Game Fishes

Nearly all moderate or low elevation streams in the unit support non-game fish. Redside shiners, suckers, and carp are particularly abundant. Many non-game species are important as scavengers of stream detritus, aquatic plants or invertebrates. Some non-game fishes are fed upon by game fishes. Therefore, moderate populations of non-game native fishes are important to the aquatic ecosystem.

Stream alterations such as water withdrawals and removal of riparian vegetation have created conditions favoring the survival of non-game species over cold water game species. Chemical rehabilitation of streams and re-stocking with game fish has been partially effective in temporarily reducing non-game fish populations.

Invertebrates

The invertebrates are the predominant group of animals in the SYU. Indeed, worldwide, they far surpass the vertebrate animals in species diversity and number of individuals, in both terrestrial and aquatic ecosystems. More than 90 per cent of all known animals are invertebrates; at least 75 per cent of these invertebrates belong to the phylum Arthropoda (Hickman, 1967). The Arthropods are jointedlegged invertebrates, a category that includes insects.

In spite of their recognized abundance and ecologic significance as decomposers, plant pests and prey species in aquatic and terrestrial food webs, little information is available on invertebrate populations indigenous to the SYU. For this reason the following general discussion will be limited to the major invertebrate groups suspected to occur in the area and for which ecologic interrelationships have been documented in other geographic areas.

Terrestrial Invertebrates

Some type of invertebrate fauna occupies all available niches from below the soil surface to the tops of the forest canopy.

Non-Arthropods, such as nematodes and earthworms, are the most numerous invertebrates in soil, while arthropods are more abundant above the soil, especially in the litter/duff layer on the forest floor.

The undersides of stones and rotten logs provide special microhabitat for a variety of invertebrates including snails and slugs, centipedes, millipedes, springtails, earwigs and certain beetles. Many common soil animals are also found in special tree hole forest microhabitat (Kendeigh, 1961).

The air space and vegetation above the soil may be considered the upper strata available to terrestrial invertebrates. The majority of upper strata invertebrates are Arthropods. Many of these animals feed on living plant materials, both foliage and stems, while others are predaceous, parasitic or scavenging.

A common upper stratum invertebrate community such as may be expected to occur in the SYU would include representative spiders, ants, wasps, flies, beetles, leafhoppers and true bugs. Population levels depend upon the amount of green foliage present (Kendeigh, 1961). Such insects as barklice (Psocopterans) would be found scavenging over the bark of trees.

Forest Insects of Economic Significance. Numerous insects attack coniferous forests. The pine beetles, Douglas-fir beetle, borers and insect damage on all forest lands (both private and public) in the United States. Aerial reconnaissance by the Forest Service in 1976 showed 81 minor insect outbreaks in the SYU, involving six species. Most of the outbreaks affected fewer than ten trees each. Table 2-21 tabulates the 81 outbreaks by insect species and host tree.

Galleries (left) made by Douglas Fir beetles,
shown close up (right) laying eggs.

(US Forest Service Photos)

TABLE 2-21

Summary of Known Insect Outbreaks in 1976.
Josephine Sustained Yield Unit. Data Compiled from USFS, Forest Insect Survey Maps.

Insect	Host Trees	Number of Outbreaks
Douglas-fir beetle	Douglas-fir	19
Fir Engraver	True firs	3
Mountain Pine Beetle	Ponderosa Pine	9
	Sugar Pine	16
	Western White Pine	1
Western Pine Beetle	Ponderosa Pine	10
Flathead Wood Borer	Douglas-fir	18
	Ponderosa Pine	2
Knobcone Pine Sawfly	Knobcone Pine	3
		81

Aquatic Invertebrates

Most of the waters within the Josephine SYU provide habitat for large numbers of invertebrates. Insects are probably dominant although various rotifers, nematodes, crustaceans and helminths may be locally more numerous.

Macroinvertebrate (invertebrates which are visible to the eye) data are not available for most of the streams in the SYU. However, some studies have been performed on the Upper Rogue River (Walsh, 1973) and the South Umpqua Basin (Stansbury, 1976) which should be representative of conditions within the SYU. As shown in Table 2-22, diversity is relatively high and indicative of clean water conditions.

TABLE 2-22

Major Aquatic Insect Groups of Known Occurrence in the Upper Rogue River and the South Umpqua Basin.

Order	Number of Families	
	South Umpqua Basin	Upper Rogue River**
*Ephemeroptera (Mayflies)	8	3
*Plecoptera (Stoneflies)	8	5
Odonata (Dragonflies)	6	1
Trichoptera (Caddisflies)	16	3
Hemiptera (True bugs)	6	1
Coleoptera (Beetles)	7	3
Diptera (flies, mosquitoes midges)	19	4
Megaloptera (Dobsonflies)	2	0
Lepidoptera (Moths, butterflies)	1	1

* Considered indicative of clean water.

** Benthic forms only

Sources: Stansbury, 1976; Walsh, 1973.

2.1.3 Social Environment

In this section are grouped categories of data descriptive of human behavior including the social, cultural, and economic aspects. This is the "people" discussion of Josephine SYU, as opposed to the non-living physical and non-human biological data previously displayed.

The discussion of social environment in the present context may be contrasted with the final section on existing land use. Both portray obvious evidence of man's action on, and interaction with, the environment. The term "social environment" as used here is intended to give strong consideration to man's sensitivities. The land use discussion addresses use allocations applicable to limited land resources.

2.1.3.1 Recreation

The Josephine SYU is in a region noted for natural beauty and physical attributes conducive to recreational pursuits of national reputation. Within the unit or near it are Oregon Caves National Monument, Crater Lake National Park, Kalmiopsis Wilderness Area, and the Rogue National Wild and Scenic River, one of the eight initial components of the National Wild and Scenic River System created by Federal legislation in 1968. The Illinois River is a State Scenic Waterway and has been recommended in part for inclusion into the National River System (Figure 2-20).

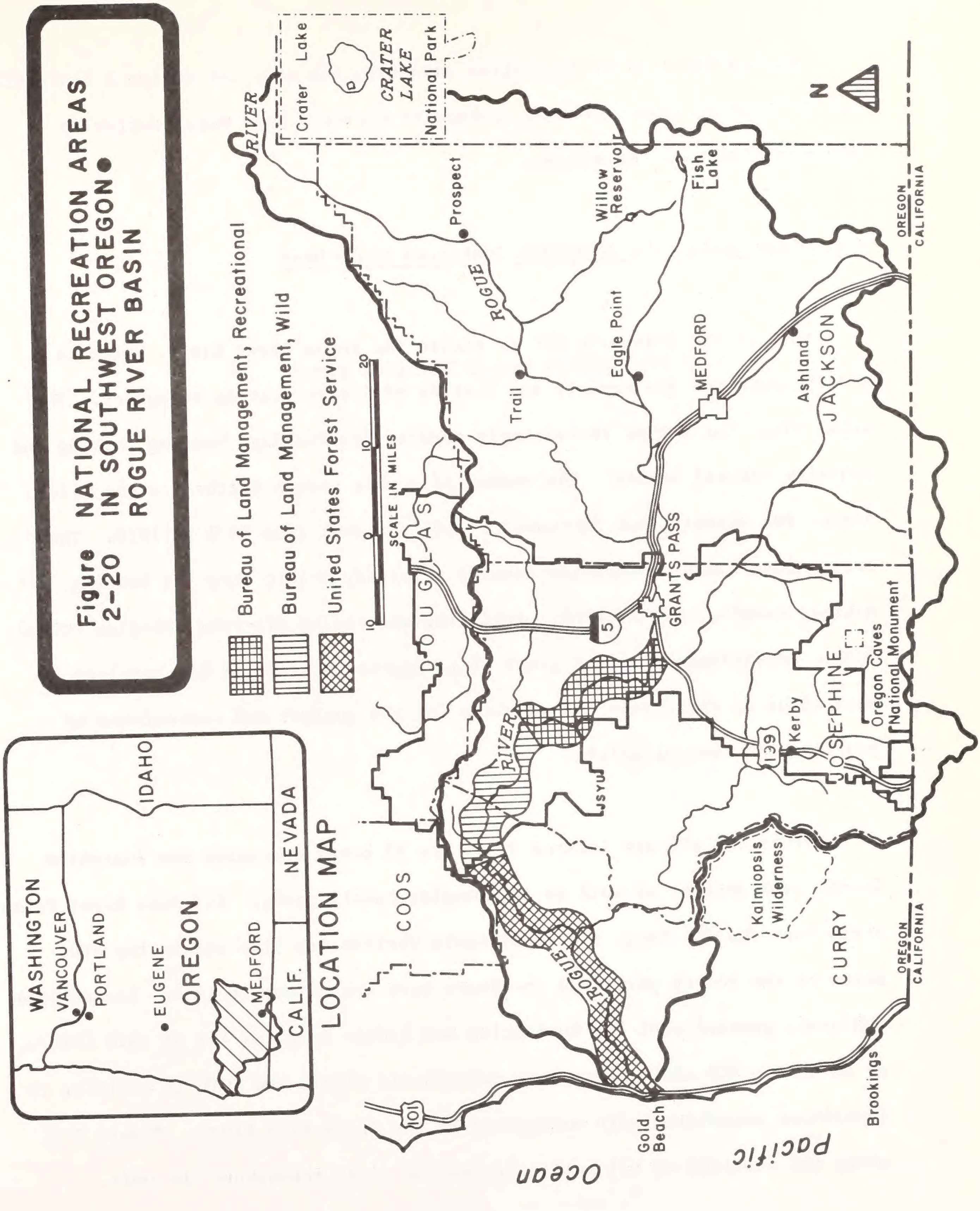


Figure 2-20 NATIONAL RECREATION AREAS IN SOUTHWEST OREGON ROGUE RIVER BASIN
Bureau of Land Management, Recreational
Bureau of Land Management, Wild
United States Forest Service
SCALE IN MILES
10
0
10
20
LOCATION MAP
WASHINGTON
VANCOUVER
PORTLAND
EUGENE
OREGON
MEDFORD
IDAHO
NEVADA
CALIF.
Crater Lake
CRATER LAKE
National Park
RIVER
ROGUE
Prospect
Willow Reservoir
Fish Lake
Trail
Eagle Point
MEDFORD
Ashland
JACKSON
DOUGLAS
GRANTS PASS
5
Oregon Caves National Monument
JOSEPHINE
Kerby
199
COOS
Kalmiopsis Wilderness
CURRY
OREGON
CALIFORNIA
Gold Beach
Brookings
101
Pacific Ocean
N

The availability of recreation amenities has made the region a desirable one in which to live. Growing numbers of visitors have made tourism an important facet of the economy.

Recreation Within the Josephine Sustained Yield Unit

Most of the Josephine SYU is within the Rogue River Basin, which is widely known for the variety and quality of its recreation resources. The Rogue River has become increasingly popular for fishing, boating, hiking and enjoying natural beauty. The number of summer season boaters on the Wild Rogue, for example, has increased by 101 per cent from 1973 to 1976. The surrounding Klamath Mountains provide a rugged, scenic area for hunting, hiking, camping, sightseeing, picnicking and riding off-road vehicles (ORVs). Public participation in the gamut of recreation activities has resulted in many kinds of facilities and services for the comfort and convenience of tourists and recreationists.

Within the SYU are located 31 of the 33 parks composing the Josephine County park system, as well as two Douglas County parks. Illinois River Forks State Park and the Rough and Ready State Wayside are also within the SYU. Seven of the county parks and the State park are on public lands, leased from BLM under provision of the Recreation and Public Purposes Act of 1926 (R&PP), as amended. BLM administers four campgrounds within the JSYU in addition to facilities associated with management of the Rogue Wild River. Figure 2-21 shows the location of all public recreation sites throughout the unit.

Figure 2-21 and legend follow this page

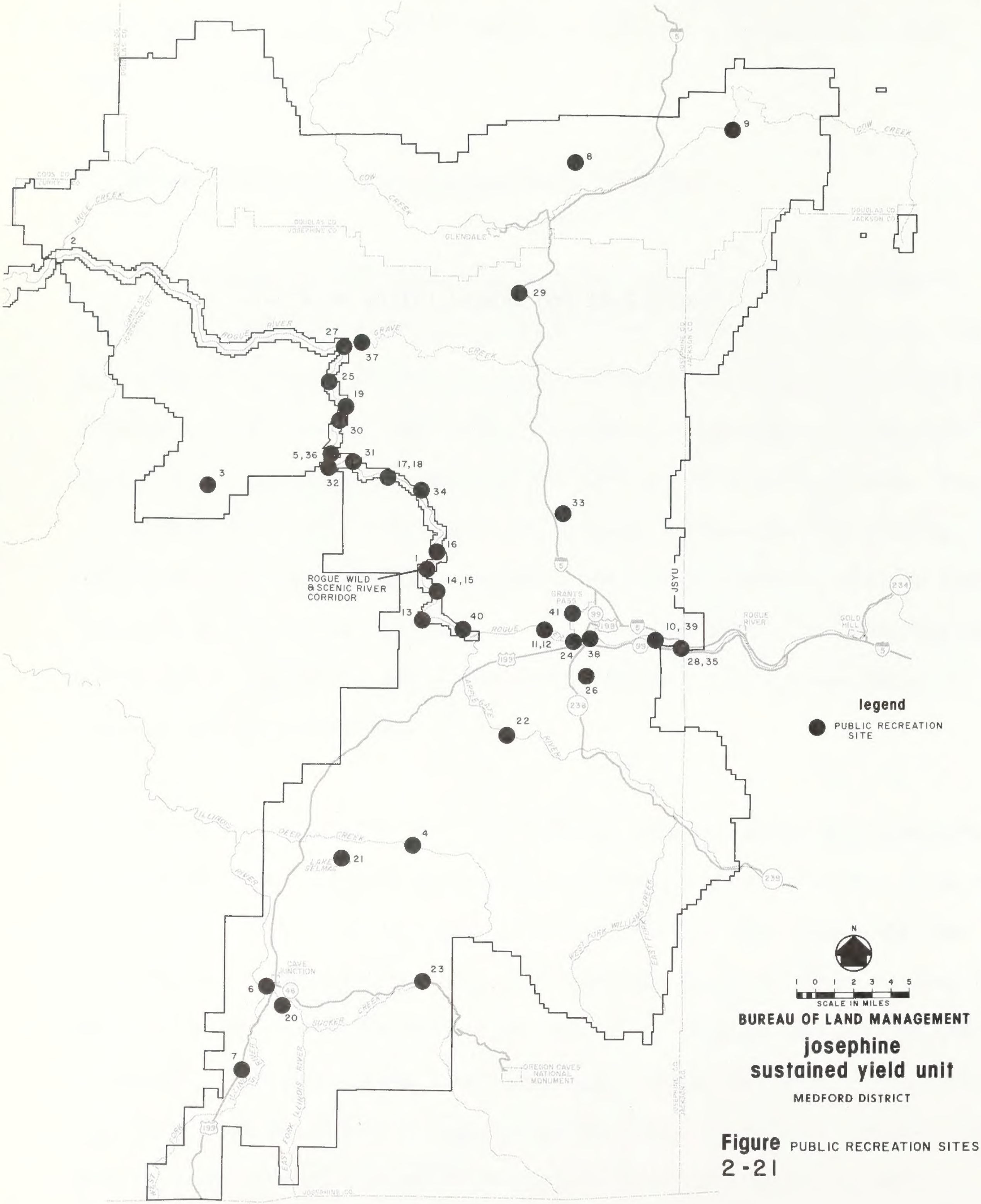


Figure 2-21 PUBLIC RECREATION SITES

Recreation Sites
(Legend for Figure 2-21)

Bureau of Land Management

1. Rogue Wild Scenic River
2. Tucker Flat Campground
3. Shady Branch Campground
4. Deer Creek Campground

State of Oregon

5. Hellgate Overlook
6. Illinois River Forks State Park (R&PP Lease)
7. Rough and Ready Wayside (R&PP Patent)*

Douglas County

8. Windy Creek
9. Whitehorse Park

Josephine County

10. Chinook Park
11. Schroeder Park
12. Lathrop Access
13. Matson
14. Upper Ferry
15. Griffin Park (R&PP Patent)*
16. Roberston Ridge
17. Hellgate (R&PP Lease)
18. Indian Mary
19. Almeda Bar
20. Illinois Valley
21. Lake Selmac (R&PP Lease)
22. Fish Hatchery
23. Sucker Creek
24. Irrigation Park
25. Argo Recreation Area (R&PP Lease)
26. Cathedral Hills (R&PP Lease)
27. Graves Creek Access (R&PP Lease)
28. Pierce Riffle
29. Wolf Creek
30. Rand Recreation Area (R&PP Lease)
31. Ennis Riffle (R&PP Patent)*
32. Carpenter Island (R&PP Lease)
33. Josephine Co. Sportsman Park
34. Hog Creek Landing
35. Foothill Access
36. Galice Launch Site
37. Reuban Recreation Area (R&PP Lease)
38. Riverside Park
39. Pearce Park
40. White Horse Park

Grants Pass

41. Highland Recreation Area (R&PP Lease)

* Title passed to local government under provision of Recreation and Public Purposes Act. Each title document contains a clause for reversion of lands to the United States if not used in conformity with the provisions of the grant.

Table 2-62 delineates acreage, management, and authority for each of these tracts. Private interests provide overnight lodging, eating facilities and guided boat rides on the Rogue River. One enterprise provides jet boat excursions for tourist groups between Grants Pass and Hellgate Canyon.

Overall use of the river basin is increasing. After a sharp reduction in visitor use during the gasoline-short years of 1973 and 1974, attendance at Illinois River Forks State Park has again been increasing. This park recorded 123,000 visitor days in FY 1975, an 86 per cent increase over FY 1974 and a 58 per cent increase over the pre-shortage period, FY 1971 (Oregon Department of Transportation, 1976).

Visits to the Josephine County parks within the SYU totaled more than 560,000 in 1975, an increase of more than ten per cent over 1974. The number of paid campers increased by twelve per cent during the same period (Josephine County Parks, 1975 Attendance Sheet). Josephine County Park Board data also show that approximately 48 per cent of the visitors are from other states, the majority from California. Within the SYU, Josephine County received an estimated 117 million visits (ie., activity occasions) in 1975 (Oregon Department of Transportation, 1976).

Timber management is not a new practice within the JSYU. Timber harvest has been carried on for decades. Most recreationists possess some degree of familiarity with timber management operations and their effects.

Recreation Related to Public Lands

Varied activities are available to recreationists on public lands within Josephine SYU. Much recreation takes place on or near the Rogue River, which is discussed separately.

Overview of the Rogue Wild & Scenic River

An 84-mile segment of the Rogue was designated a component of the National Wild and Scenic River System in 1968. The designated section administered by BLM is entirely within the JSYU, extending from the mouth of the Applegate River downstream approximately 47 river miles to the east boundary of the Siskiyou National Forest near Marial. The remainder of the Rogue Wild and Scenic River, approximately 37 river miles from the Siskiyou National Forest boundary downstream to the Lobster Creek Bridge, is under the administration of the Forest Service (Figure 2-20). Both BLM and USFS prepared master plans in 1969 for the river segments administered by each, and a joint plan was prepared in 1972.

The Wild and Scenic Rivers Act provides for the management of a designated river or river segments as wild, scenic, or recreational. Within the BLM section of the Rogue River, two of the three management classifications are utilized. A 27-mile long recreational river area, extending from the mouth of the Applegate River to the Grave Creek Bridge, is managed to provide or restore a wide range of outdoor recreation opportunities on the river. The remaining

20-mile section is classified as a wild river area. It is managed to preserve the river and its immediate environment in a natural, wild, and primitive condition essentially unaltered by the effects of man as well as to provide river-oriented recreation opportunities within a primitive setting.

Approximately 11,087 acres of the Rogue Wild River corridor (the area within 1/4 mile on each side of the river) within the SYU have been withdrawn from timber harvest to protect the scenic and recreational values. Management objectives contained in the 1972 master plan also provides for protection of scenery within view of the river or adjacent Rogue River Trail even if the seen area is outside the withdrawal area (37 FR 131: 13415, 1972).

Visitation to the Rogue River has increased substantially since it was included in the National Wild and Scenic Rivers System. The popularity of the river, which is also included in the Oregon Scenic Waterway System, resulted in the need to ration use to protect the values for which the river was included in the National System. Restrictions were implemented in 1973 to limit the number of commercial boating parties. A permit system was adopted by the Oregon Marine Board in 1976 and will be effective in January 1978. It will limit the numbers of both commercial and private boating starts on the wild river to 120 people a day during the summer. This system is designed to spread use evenly throughout the regulated period while reducing weekend and holiday use.

In 1976, 1480 parties (more than 12,000 persons) visited the wild river during the summer and fall. The number of people boating on the wild Rogue during the summer season has doubled from 1973 to 1976 (Table 2-23). The number of day users at the Grave Creek checkpoint during the summer season has grown from 1916 visitors in 1973 to 4639 in 1976, an increase of 142 per cent. However, use at developed sites along the recreational portion of the Rogue has increased very little since 1974. While BLM does not manage any campground or day use recreation areas along this portion of the river, use data from twelve Josephine County parks located along this river segment show an increase from 258,500 visitors in 1974 to 275,500 visitors in 1975, an increase of about five per cent. These figures do not include the fishing and picnicking which occurs along non-developed public access areas. Based on average daily traffic (ADT) counts on county roads which provide access to the recreation river, over 4,000 visitor days of sightseeing can be attributed to public lands during 1974.

Sightseeing

General sightseeing results when persons drive through public lands, whether they are specifically visiting public lands or merely passing through. Land administered by BLM provides a backdrop of forested hills where the viewer can observe different forest types and land patterns resulting from timber management and other activities. Often termed driving for pleasure, general sightseeing is primarily associated with travel along established roadways. A primary indicator of general sightseeing participation is road

TABLE 2-23

Rogue Wild River Boating Use
Summer Season
(Memorial Day-Labor Day)

	1973	1974	1975	1976	Percent Increase (1973-1976)
Commercial Boating					
Parties	255	246	285	311	
People	3,340	3,704	4,000	4,885	48%
Non-Commercial Boating					
Parties	207	277	415	632	
People	1,002	1,736	2,520	3,854	285%
Total Boating					
Parties	462	523	700	94	
People	4,342	4,440	6,520	8,739	101%

Source: Bureau Planning Documents: Rogue Wild River Recreational Use Census.

statistics. Based on ADT counts for 1974, over 200,000 visitor days of sightseeing can be attributed to public lands outside the Rogue River corridor.

In addition to general sightseeing, persons utilize public lands for specific sightseeing goals or sightsee in connection with other activities, particularly hiking or stream floating. Various resources on public lands furnish a basis for sightseeing related activities. Figure 2-22 shows the location of known areas which attract this use.

In the southern portion of the Josephine SYU, numerous caves provide information about geological occurrences and may contain interesting minerals or unusual plant and animal life. Some of these caves can provide a physical challenge or an adventure in exploration as well as sightseeing.

Botanical sightseeing encompasses the viewing of common forest types as well as plants with unusual botanical value. A number of unusual and possibly rare and endangered plants inhabit the SYU. Threatened and endangered plant species are discussed in the vegetation section. Places which have unusual botanical value include the Rogue Wild River Area, Hobson Horn, Cedar Mountain, Eight-Dollar Mountain, Rough and Ready State Wayside, Brewer Spruce Research Natural Area, Myrtlewood Grove, and Woodcock Bog. Numerous other sites have been inventoried by the Nature Conservancy; however many of these are not a matter of public record. Serpentine areas occur throughout the SYU and are of interesting botanical value. Areas of serpentine soils are shown in Figure 2.8.

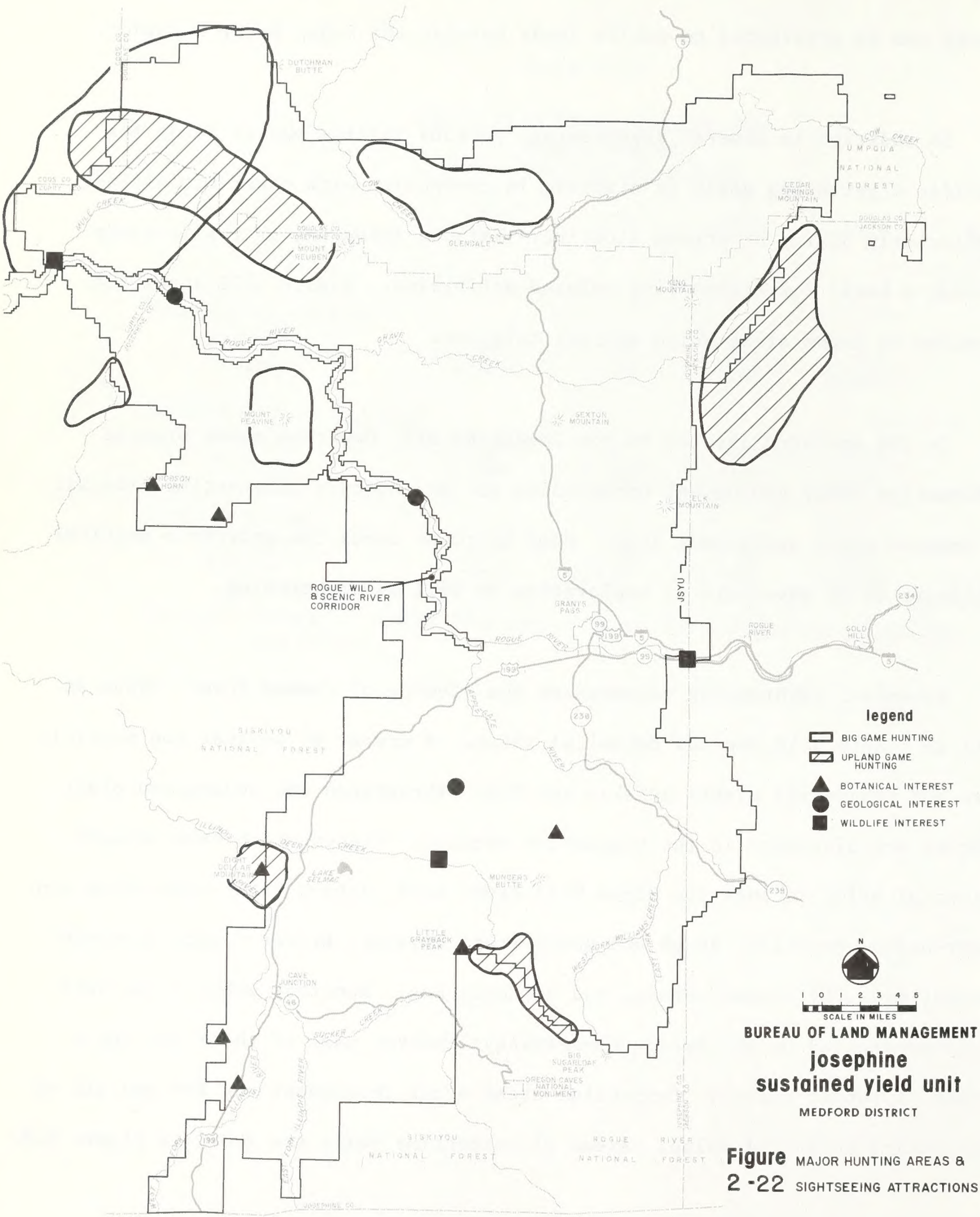


Figure 2-22 MAJOR HUNTING AREAS & SIGHTSEEING ATTRACTIONS

The unusual plant communities and vegetation found in these serpentine areas are discussed in Section 2.1.2.1. Specific areas set aside for their botanical value are discussed further in Section 2.1.4.

A variety of birds, small animals, deer and bear may occasionally be seen from roads or rivers. An area within the Rogue Wild River Corridor near the Rogue River Ranch has been recommended by the Oregon Fish and Game Commission for a wildlife viewing area. Wildlife that can be seen in the vicinity of the ranch include black-tailed deer, black bear, river otter, silver gray squirrel, mountain quail, osprey, great blue herons, bald and golden eagle and the common merganser. These species are visible all along the designated wild river. The Nature Conservancy has inventoried several heron rookeries, two eagle nests and an osprey nest within or adjacent to public lands.

There are several sites of historical interest, three of which are designated in the National Register of Historic Places. A discussion of these sites along with a map and tables can be found in the section on Cultural Resources.

Hunting

Opportunities exist for hunting big game (deer, elk and bear), upland game birds, small game, and to a limited extent, waterfowl. With one exception, all public lands in the SYU are open to hunting. The area one mile on either

side of the Rogue River beginning at Grave Creek and extending beyond the Josephine SYU to Lobster Creek is closed to bear hunting. Figure 2-22 shows locations of major hunting areas.

Hunting for black-tailed deer is the most popular hunting activity in the SYU in terms of hunter days on public lands. This is followed by hunting upland game birds, silver gray squirrel, Roosevelt elk, waterfowl, and black bear, respectively (see Table 2-24).

The wildlife hunting resource produced on the public lands is significant and accounts for eighteen per cent of the hunter days expended in the four State-administered Big Game Management Units (B.G.M.U.) which cover the SYU. Total hunter days may reflect some overlap because several hunting seasons run concurrently. Harvest figures computed in Table 2-24 reflect a seven per cent harvest of the estimated deer population. This harvest is far below the resource production capability. The trend in the number of deer harvested and per cent of hunter success is shown in Table 2-25. This low hunter success reflects a trend of a declining deer population which has continued since the severe winter of 1968-69. A discussion of this trend appears in Section 2.1.2.2.

Virtually all of the public lands within the SYU provide habitat for some species of wildlife. It is estimated that at least 60 per cent of the hunting effort that occurs on public lands is due in part to suitability of habitat and limitations on access to private land.

TABLE 2-24

Annual Harvest and Hunter Days
Attributable to Public Lands, JSYU
(yearly average, 1970-1975)

	Number Harvested on Public Lands	Hunter Days on Public Lands	Hunter Days/ 1,000 acres Public Land
Black Tailed Deer[1/]	633	14,480	34.013
Roosevelt Elk[1/]	29	1,080	2.537
Black Bear[1/]	26	254	.597
Silver Grey Squirrel[1/]	896	1,528	3.589
Upland Game Birds[2/]	6,229	5,436	12.769
Waterfowl[2/]	202	271	.637
TOTAL		23,050	

1/ Based on per cent of public lands within BGMU
2/ Based on per cent of public lands within Josephine County

Source: Josephine Planning Area Analysis

TABLE 2-25

Deer Harvest: 1970-1975

Oregon Big Game Mgmt. Unit (BLGM)	Year	Number of Deer Harvested	Hunter Success per cent	Percent of Public Lands in BGMU	Est. Harvest1/ on Public Lands
Powers	1970	930	42	24	223
	1971	1,040	57	24	250
	1972	860	34	24	206
	1973	790	27	24	190
	1974	720	20	24	173
	1975	700	23	24	168
Evans Creek	1970	750	37	15	113
	1971	770	46	15	116
	1972	930	41	15	140
	1973	1,450	30	15	218
	1974	1,440	26	15	216
	1975	430	11	15	65
Chetco	1970	1,050	45	7.8	82
	1971	730	31	7.8	57
	1972	1,360	49	7.8	106
	1973	1,670	35	7.8	130
	1974	780	21	7.8	61
	1975	670	20	7.8	52
Applegate	1970	1,490	36	13	194
	1971	1,320	35	13	172
	1972	1,190	29	13	155
	1973	2,570	26	13	334
	1974	2,230	23	13	290
	1975	710	10	13	92

1/ Based on the assumption that deer habitat within each BGMU is homogeneous. Number of deer harvested in each BGMU is then multiplied by per cent public lands within BGMU to give estimated harvest on public lands.

Source: Department of Fish and Wildlife, Annual Reports 1970-75.

Fishing

Most of the fishing in the SYU is for salmon and trout. The Rogue is internationally known for its outstanding salmon and steelhead trout fisheries. Salmon fishing also occurs below Pomeroy Dam on the Illinois River. The Applegate River, a major tributary to the Rogue, sustains limited fishing but could become an important steelhead fishery with flow augmentations from the proposed Applegate Dam. There are no public lands fronting on this river within JSYU. The Oregon Department of Fish and Wildlife has planted segments of the Applegate River, Rogue River, Sucker Creek and Cow Creek with legal size rainbow trout which constitute a put and take fishery. In 1974-75, there were 32,705 angler days attributable to cold-water fishing on public lands within the JSYU. Table 2-26 further shows that the overall annual contribution of the combined fishery resources for streams on public lands within the JSYU is an estimated 46,324 angler days and 38,422 fish caught in various freshwater and ocean sport fisheries. An additional 33,600 fall chinook and 269 coho attributable to habitat production within the JSYU are landed by the commercial ocean troll fishery.

While fishing for anadromous species is limited to main stems of the three drainages mentioned, resident trout fishing occurs or could occur on many side streams. None of these streams offers outstanding opportunities: some lack trout in large sizes or quantities, some are inaccessible either physically or legally. Use pressures on all of them are light to moderate, in relation to the opportunities available on the major streams.

Table 2-26

Angler Days and Game Fish Sport Catch
Within the Josephine Planning Area
and Sport Fishery Outside the Planning Area
Attributable to Habitat Production Within
the Planning Area
1974-75

	I. Angler Days in the Unit			Catch Within the Unit		
Species	Angler Days	on Public Land	on Public Land	Catch	% Public Land	Annual Catch Attributable to Habitat Production within JSYU
Summer steelhead	38,800	36	13,968	9,700	36	3,492
Winter steelhead	31,000	27	8,370	7,750	27	2,093
Spring chinook	2,805	46	1,290	850	46	391
Fall chinook	2,673	28	748	810	28	227
Coho salmon	33	28	9	10	28	3
Resident trout	26,000	32	8,320	6,500	32	20,800
		Subtotal	32,705		Subtotal	27,006

II. Angler Days in Lower Rogue (off-site)				Catch in Lower Rogue		
Species	Angler Days	% Habitat on Public Land	Angler Days on Public Land	Catch	% Public Land	Annual Catch As Above
Fall chinook	780	28	218	520	28	146
Summer steelhead	10,874	36	3,915	4,565	36	1,643
Winter steelhead	9,912	27	2,676	4,130	27	1,115
		Subtotal	6,809		Subtotal	2,904

III. Ocean Sport Fishery Angler Days				Ocean Sport Fishery Catch		
Species	Angler Days	% Habitat on Public Land	Angler Days on Public Land	Catch	% Public Land	Annual Catch As Above
Fall chinook	24,000	28	6,720	30,000	28	8,400
Coho salmon	320	28	90	400	28	112
		Subtotal	6,810		Subtotal	8,512

				IV. Commercial Ocean Troll Fishery Catch		
Species				Catch	% Public Land	Annual Catch As Above
Fall chinook	-	-	-	120,000	28	33,600
Coho salmon	-	-	-	960	28	269
					Subtotal	33,869

TOTAL ANGLER DAYS (combined Sport Fishery Resources) 46,324

TOTAL CATCH (combined fishery resources) attributable to habitat production within JSYU 72,291

Source: Josephine Planning Area Analysis, 1977.

A major limitation on fishing opportunities in valley streams is the diversion of water for irrigation purposes. With the annual onset of crop irrigation, some streambeds are nearly dried. Thus only the upper reaches of many side streams support a usable resource. In a dry year, like 1976-77, this situation is exacerbated.

Winter Sports

There are few opportunities for winter activities due to topography and weather conditions. Some snow play and snowmobiling does occur, mostly alongside logging roads. Participants in this minor activity are mostly from the local area.

Water Sports

The primary water sport is floatboating on the Rogue Wild River. Twenty miles of the Rogue, from Grave Creek to Marial, is of outstanding quality for this activity. Floatboating on the recreational portion is comparatively low, though both private and commercial parties use it. Power boating, including commercial jet boat tours, occurs on the recreational segment.

Sailboating and swimming take place at the Josephine County facility at Lake Selmac. Unsupervised swimming occurs at Illinois River Forks State Park and along other streams and creeks throughout the SYU. No data are available on the use of public lands for water sports other than floatboating.

Collecting Rocks and Minerals

Opportunities for recreational gold panning may be found at several streams throughout the area. Collecting is known to take place at Grave, Mule, Galice and Coyote Creeks. Collection of agate, Oregon jade (green garnet) and Josephenite is reported to occur within the sustained yield unit. Use estimates are not available.

Motorcycle and Four-Wheel Drive Use

Operating motorcycles and four-wheel drive vehicles on logging roads, jeep trails and skid trails is very popular and accounts for much of the total recreation experience on public lands in the SYU.

There are no trails specifically designated for ORV use. Certain areas are popular for hill climbing and general play. These are shown in Figure 2-23.

Hiking

Prior to construction of the present road system, many fire access trails existed in the JSYU, some of them built in the 1930's by the Civilian Conservation Corps. While the Rogue River Trail is the only hiking trail designated and maintained by BLM within the Josephine SYU, remnants of the old trails can still be identified where undisturbed by road construction or logging. These trails, especially in roadless areas such as those within the Rogue River

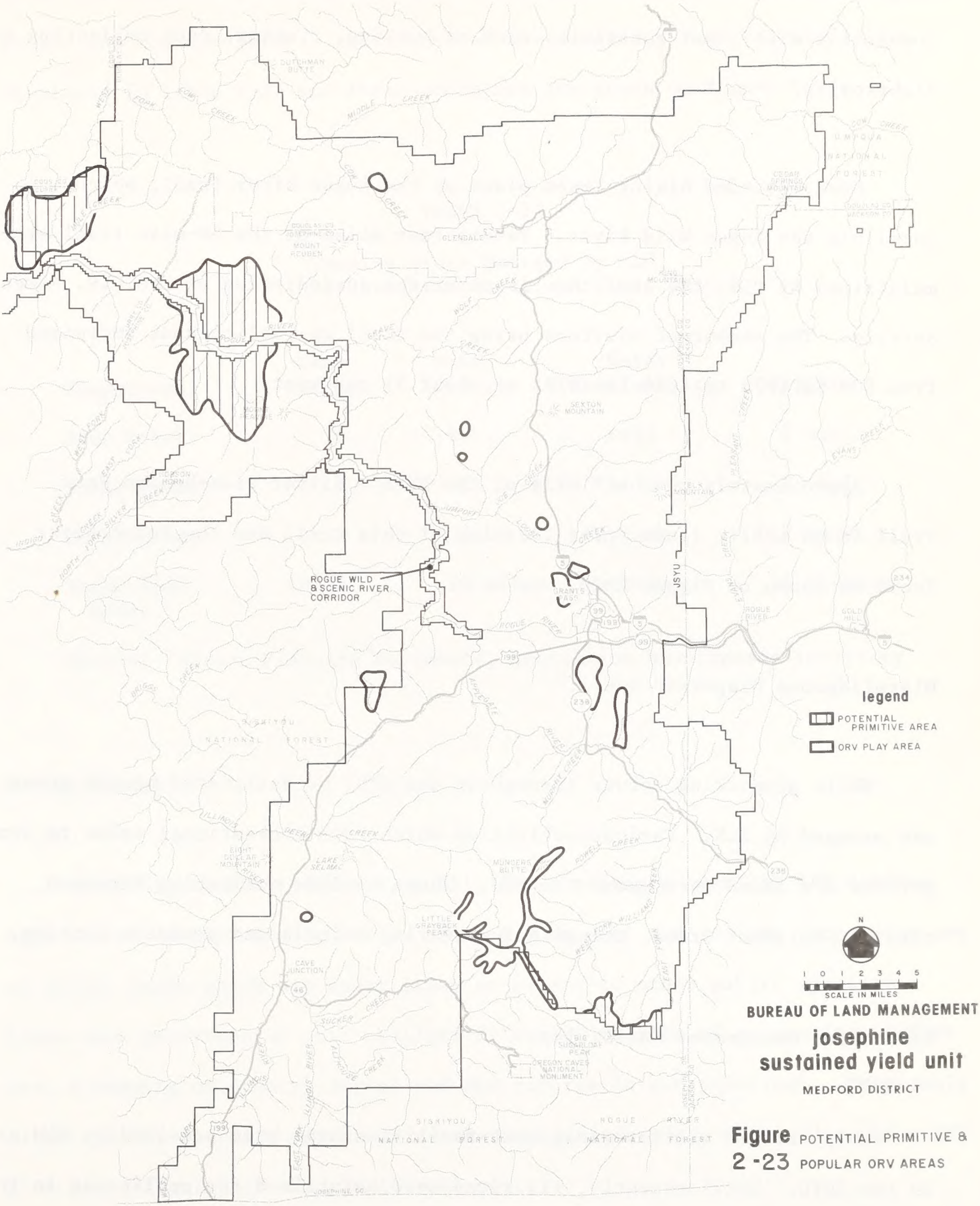


Figure 2-23 POTENTIAL PRIMITIVE & POPULAR ORV AREAS

Canyon, sustain an unknown amount of hiking. Incidental hiking occurs in connection with other activities such as hunting, fishing, rock collecting and sightseeing.

Most recorded hiking takes place on the Rogue River Trail, which parallels the Rogue Wild River. Twenty-four miles of the 68-mile trail are maintained by BLM; the remainder is under the jurisdiction of the U.S. Forest Service. The number of visitors using the trail on public lands increased from 809 in 1973 to 1046 in 1976, or about 31 per cent.

Approximately one-half mile of the USFS's Silver Peak-Hobson Horn Trail is on public lands. The location of this trail and the Rogue River Trail is shown on Figure 2-20.

Miscellaneous Dispersed Use

While picnicking occurs throughout the SYU, no designated picnic areas are managed by BLM. Various activities which have recreational value to some persons are found throughout the SYU. These include collecting firewood, cutting Christmas trees, trapping fur-bearing animals and predator hunting.

Recreation Management Facilities

Only limited visitor management facilities have been provided by BLM within the JSYU. Until recently, six sites were maintained for public use in the

area. Two, however, were closed due to sanitary problems, limited maintenance funds, and low use rates. Attributes of the remaining four facilities are displayed in Table 2-27 and their locations are shown on Figure 2-21.

TABLE 2-27

Camping Areas Managed by BLM
Within Josephine Sustained Yield Unit

Campground	Camp Sites	Size (Acres)	Water Availability	Toilets
Deer Creek	16	40	well	5 vault
Shady Branch	4	2	well	2 vault
Tucker Flat	8	5	spring	2 vault
Rogue Wild River	10-15	20 miles	stream	16 chemical

Source: Bureau Planning Documents, Recreation Development Inventory

Use Estimates

According to BLM estimates, public lands received over 334,670 visitor days of use in 1976 (Table 2-28). This figure does not include recreation use of public lands which are under lease or patent to other public agencies. Since each governmental unit utilizes different methods of accounting visitor use, a summing of county, State, and BLM figures is not practical. Previously cited visitor use data for other recreation jurisdictions within Josephine SYU give an indication of this additional use.

TABLE 2-28

Estimated Recreation Use on Public Lands, 1976

Activity	Visitor Days (12 hour visitor day)
Rogue Wild River	
Boating 1/	
Overnight 2/	54,540
Day Use	10
Hiking 1/	
Overnight 2/	6,680
Day Use	440
Rogue Recreation River 3/	
Sightseeing	4,100 5/
Motorcycle/ORV/4-wheel	16,300
Camping (non-Rogue River)	9,800 6/
Fishing	12,100
Hunting	4,900
General Sightseeing	217,300 5/
Miscellaneous 4/	8,500
	334,670

1/ Includes 967 visits (485 visitor days) of fishing activity
2/ Overnights at private lodges are included.
3/ Use estimates for dispersed recreation at non-county sites not available.
4/ Includes snow, play, collecting, sightseeing other than general sightseeing (historial, botanical, wildlife, geological), incidental hiking, camping, and picnicking in underdeveloped areas. Estimate is based on professional judgement.
5/ 1974 latest data available
6/ FY 74 latest data available

Source: Medford District, BLM.

Table 2-29 shows the per cent of activity occasions accounted for by each activity type in comparison with the total of all recreational activity generated by Josephine County residents. Camping, for example, represents 4.2 per cent of all the recreational activity in Josephine County. Table 2-30 shows the percentage of Josephine County's population in 1975 that participated in nineteen recreation activities.

Demand Projections

By 1990, the population of Josephine County is expected to increase by 46 per cent of the 1975 population (Portland State University, Center for Population Research, 1976). This figure can be used to project increased recreational use as a result of local demand. The Oregon State Highway Division estimates that, by 1990, statewide recreation demand will increase by 103 per cent over 1970 estimates (Oregon Statewide Outdoor Recreation Plan, 1972). These estimates are based on both instate and out-of-state use and other concomitant trends. Based upon these projections of demand, Table 2-31 presents estimated current use and low and high estimates of projected 1990 demand (Josephine Planning Area Analysis, 1977).

Potential Recreation Management Facilities within Josephine SYU

At least 19 sites have been identified as having recreation values for future development. Four sites have potential for facility development such as campgrounds. The remainder have potential for limited development such as

Table 2- 29

Distribution of Recreational Activity for Josephine County in 1975.

Activity	Distribution
Camping	4.2
Picnicking	8.6
Nonpool swimming	2.1
Fishing	8.9
Motorboating	1.5
Floatboating	1.3
Water skiing	0.6
Pleasure walking	22.8
Hiking	2.6
Hunting	1.8
Outdoor Games	11.9
Bicycling	4.7
Horseback	1.2
Down-Hill Ski	0
Cross-Country Ski	0
Snow Play	0
ORV	7.0

Source: Oregon State Parks and Recreation Branch, Department of Transporation, Oregon Outdoor Recreation Demand Bulletin 1975, Technical Document I of the Statewide Comprehensive Outdoor Recreation, 1976.

Table 2-30

Percent of Josephine County Population Participating in Recreation activities compared to Statewide Percentages (1975)

ACTIVITY	Josephine County	Statewide	ACTIVITY	Josephine County	Statewide
Camping	51.67	54.13	Hunting	19.57	18.83
Picknicking	70.37	73.04	Outdr Games and Sports	34.65	32.66
			Bicycling	24.60	35.36
Non-Pool Swimming	34.92	34.40			
Sight Seeing and Driving for Pleasure	36.38	42.92			
Fishing	41.17	47.60	Horse Back riding	6.61	10.57
Motor Boating	16.47	27.27	Downhill Skiing	4.23	7.53
Float Boating	7.67	11.26	Cross-county Skiing	2.11	2.98
Water Skiing	12.94	14.47	Snow Activities	31.76	25.42
Pleasure Walking	35.18	45.71	Off Road Vehicle Activity	11.90	14.54
Hiking	29.36	35.16	Other	2.11	3.51

Data for pool swimming, golfing, and tennis were not included.

Source: Oregon State Parks and Recreation Branch, Department of Transporation, Oregon Outdoor Recreation Demand Bulletin 1975, Technical Document I of the Statewide Comprehensive Outdoor Recreation Plan, 1976.

TABLE 2-31

Estimated and Projected Visits to Public Lands

	Visits/Year	1990 Visits/Year Low	1990 Visits/Year High
Hunting	23,050	33,653	46,792
Fishing	28,367	41,416	57,585
Winter Activities	262	383	532
Water Activities	30,227	44,131	61,361
Collecting	794	1,159	1,162
Sightseeing			
Historical	1,872	2,733	3,800
Geological	410	599	832
Zoological	1,374	2,006	2,789
Scenic	26,361	38,487	53,513
Botanical	1,428	2,085	2,899
Off-Road Vehicle Use	41,888	61,156	85,033
Primitive Values	1,004	1,466	2,038
Camping	4,650	6,789	9,440
Picnicking	50	73	102
Total	161,737	236,136	328,807

fishing access, trails, or picnic areas. Figure 2-24 shows the approximate location of these sites. It is not known whether any of these sites will be needed in order to manage future recreation use on public lands.

The U.S. Forest Service has determined that the Illinois River from the Siskiyou National Forest boundary at Eight Dollar Mountain upstream to the California State line, qualifies for recreational status under the criteria established for wild and scenic rivers but has recommended that this portion of the river not be included in the National System. BLM administers 6.5 per cent (1,780 acres) of the land within one-quarter mile of this river segment as part of the Josephine SYU (U.S. Forest Service, 1977).

2.1.3.2 Cultural Resources

General

The term "cultural resources" as used in this statement primarily refers to remains of human activity. However, since fossils which are of historic, scientific, and unusual interest are protected by the Antiquities Act of 1906, this category is included in this section. Structures, artifacts, works of art, irrigation systems, architecture, historical documents, and locations where historical events took place are only suggestive of the broad range of objects and sites that are considered to be cultural resources.

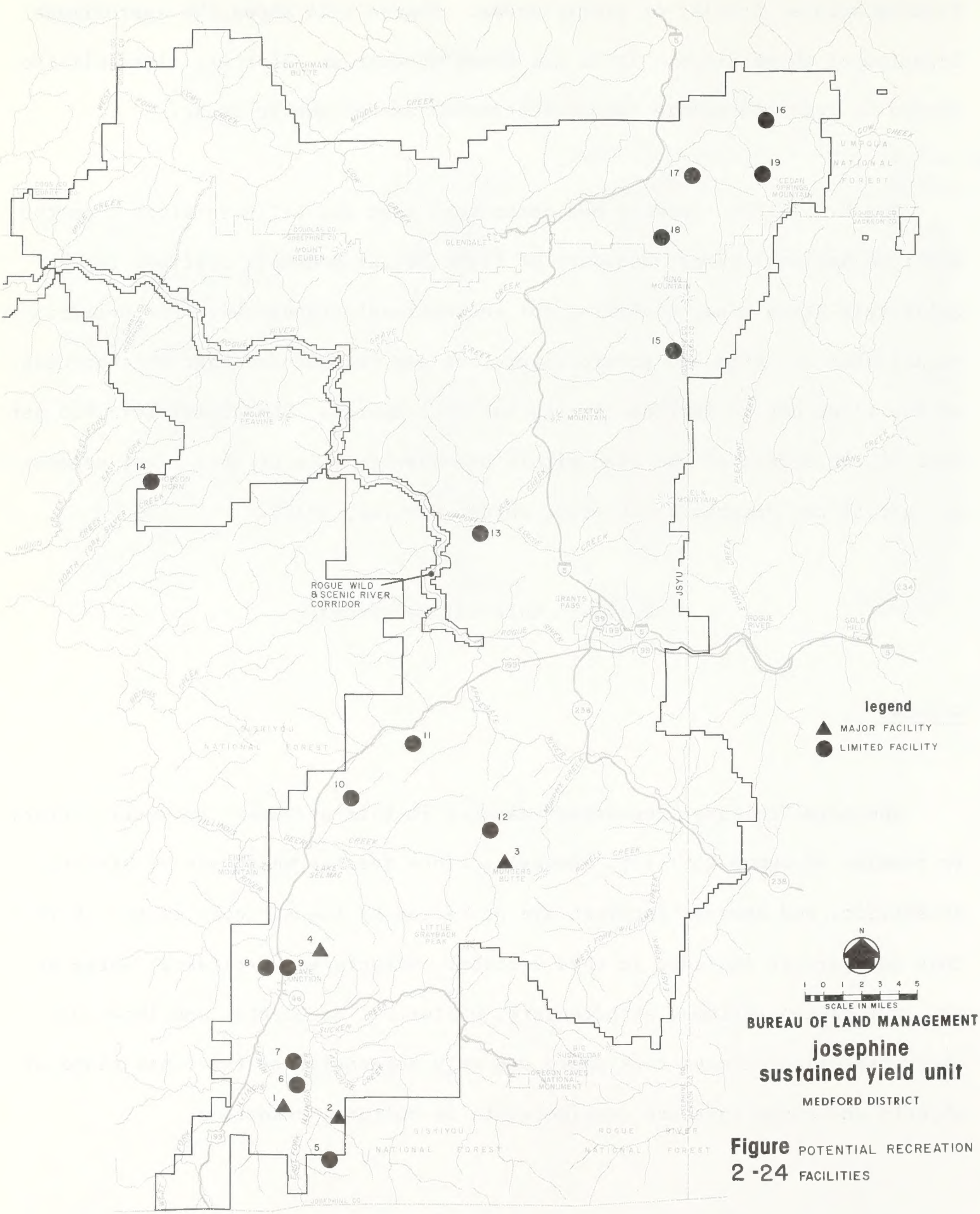


Figure 2-24 POTENTIAL RECREATION FACILITIES

Federal agencies have been charged with responsibility for the cultural resources on lands under their jurisdiction. Through a group of laws beginning with the Antiquities Act, BLM has been authorized to identify, protect and enhance such resources on public lands. The following procedures were used to identify the cultural resources within the Josephine SYU.

1. The State Historic Preservation Office was asked to identify:
   a. Sites within the area that are on the National Register,
   b. Sites that are known in that office as being eligible for nomination to the National Register.

2. The pertinent literature, both published and unpublished, was consulted. Works used are listed in Appendix L.

3. Knowledgeable persons from within and outside the area were asked for information. They included amateur archeologists, elderly residents, the Josephine County Historical Society and the Jacksonville Museum.

4. The Medford District Cultural Resources Specialist provided the information that he has acquired through project clearance and general reconnaissance of the area.

5. The most recent listing of the National Register of Historic places was consulted.

The topography and dense forest covering most of the area make an on-the-ground sample survey of cultural resources almost totally ineffective.

General inventory survey, as distinct from project-oriented field-checking is most productive and useful if attention is focused on such open areas as dirt roads, trails, stream banks, meadows, and previously cutover tracts. Survey of undisturbed forest tracts would be in most cases an exercise in futility and would be wasteful of time and money that could instead be used to generate useful, if less than perfect, archeological information through selective reconnaissance (Aikens, 1976). Another study (Lovis, 1976) stops short of describing such efforts as futile but states that the low productivity of the sampling program and the little confidence in the quality of coverage, despite laudable methodological rigor and a major investment of time, make that conclusion inevitable.

Due to the size of the existing cultural resource data base in western Oregon and the futility of general inventory surveying, it is not possible to make predictive statements about types and/or locations of cultural resources likely to be present in the JSYU. Within this region, where little is known of archeology, any and all sites are important. Those that are known are treated as significant.

The criteria used to assess the eligibility of identified cultural resources for inclusion in the National Register of Historical Places are described in 36 CFR 800.10. BLM employs a Cultural Resources Evaluation

System (CRES) to stratify the relative value of an archeological or historical site. Significance ratings from S-1 (National Register nomination quality) to S-4 (no physical remains) are assigned to each identified cultural resource. A CRES rating is not static. Periodic review, in light of new information, assures continuation of adequate evaluation.

Before Contact with Whites

It is a well-documented fact that at least some areas in Oregon have been occupied by aboriginal populations for at least 12,000 years. There is good reason to hypothesize that portions of the Josephine area have been utilized over the same time span. However, largely because of topography and dense ground cover, the area has not attracted the attention of the archeological research community. Only eight publications are listed in Johnson and Cole's "Bibliographic Guide to the Archeology of Oregon" - 1972. Three of these are reports of surveys done prior to the construction of reservoirs, and three are reports of salvage operations prior to reservoir construction.

Cressman's "Final Report on the Gold Hill Burial Site" and "Aboriginal Burials in Southwestern Oregon" are the only research-directed studies available. These were done in 1933 and have very limited application beyond the specific sites. As a result of the lack of research interest, only eight prehistoric sites have been recorded:

Hellgate Site (T.35S R.7W)	35-AR-11-43 (T.32S R.9W)
MNH 35 do-15 (T.31S R.9W)	35-AR-11-44 (T.31S R.9W)
Jackass Prairie (T.32S R.8W)	McCaleb Ranch (T.37 R.9W)
35-AR-11-42 (T.32S R.9W)	35-AR-11-45 (T.31S R.9W)

While the prehistory of the area has been largely ignored, there has been some work by ethnologists on the life-styles of the inhabitants during the time just prior to white contact. Essentially the entire area within the Josephine SYU was occupied by Takelma (or Dagelma) Indians. The Takelma language is not related to the language of any group in the surrounding area. Estimates of total population do not exceed 500, divided into the Lowland and the Upland groups. Both groups were semi-sedentary and spent a considerable part of each year in small villages of perhaps 50 to 150 people. The Takelma were hunters and gatherers, although the bulk of the caloric intake came from vegetable rather than animal foods. Considerable use was made of salmon, freshwater mussels, and crayfish. Extensive forest burning was practiced with the result that the vegetation in the valley area at the time of white contact was not what it would have been without human occupation. Much use was made of basketry. Crudely fashioned, fired pots and small figurines were made. Pit-houses were built of split pine boards with gable roofs. The principal weapon was the sinew-backed yew wood bow.

The Takelma in general and the Upland Takelma in particular had a reputation for ferocity, making frequent raids upon other Indian tribes for slaves. They also resisted white intrusion. So hostile and troublesome were the native peoples that French fur trappers referred to them as "rogues". Thus the Rogue River and the Rogue River Indians became known to white newcomers.

While there may be some individuals who can claim biological descent from the Takelma, the group has long since vanished as a linguistic and cultural entity. Preliminary linguistic and ethnographic analyses tend to show that the Takelma had occupied the area for several hundred years.

CRES rating criteria for archeological resources include depth of site architectural features, artistic features, size of site, age of antiquity, length of occupation, uniqueness of the site, representativeness, and condition. Application of CRES to the few pre-contact sites identified in the statement area results in data displayed in Table 2-32.

Post White Contact

The inland areas of southwestern Oregon were first penetrated by Europeans in the mid-1820's when the Hudson Bay Company began sending fur brigades from Fort Vancouver southward to trap the valleys. The Americans, most notably Ewing Young, began to enter the area in the 1830s. Young went to San Francisco where he purchased 750 head of cattle which he drove north more or less along the present route of Interstate 5 to the Willamette settlements in 1837. Thus by the late 1840's a fairly well traveled route had been established between the rapidly growing settlements of the Willamette Valley and the San Francisco area. The traffic swelled in 1846 when the Applegate trail was established across the Black Rock Desert of Nevada and the mountains between Lake Klamath and the Rogue River Valley, linking up with

Table 2-32

Archeological Sites Within the Josephine SYU

Archeological Sites	Attributes/Condition	Significance/ Rating	Jurisdiction
McCaleb Ranch	Indian burials and artifacts. Private owner allows no investigation	S-2	Private
Hellgate Site (recorded)	Surface scatter of lithic debris. Vandalized	S-3	BLM
MNH 35 DO-15	Surface scatter of obsidian flakes	S-3	BLM
Jackass Prairie	Area of springs and young timber; may have been on Indian hunting site	S-3	BLM
35-AR-11-42	Lithic scatter - very recently identified	S-2	BLM
35-AR-11-43	" " " " "	S-2	BLM
35-AR-11-44	" " " " "	S-2	BLM
35-AR-11-45	" " " " "	S-2	BLM

Note: CRES ratings S-1 to S-4 for archeological resources are defined as follows:

S-1. National Register Significance. In general, S-1 properties show a clear potential for yielding, or have yielded, highly significant scientific/educational information and are clearly important in terms of national, State, or local prehistory.

S-2. Mid-Significance. S-2 properties are usually not particularly unique, representative, nor do they have important associations. The condition of the property usually is only fair. These kinds of properties are often large but do not have great antiquity and only limited depth potential.

S-3. Low Significance. The S-3 rating is assigned if the main worth of the property is its potential for contributing data in regards to solving larger problems, such as reconstruction of paleo-environments and areal human usage patterns. These kinds of properties usually show little if any depth, no or very few features, may have great antiquity but be very small, or may be very large but show no great antiquity or concentration of materials.

S-4. Data Property. The S-4 rating is assigned only to properties that have been totally destroyed.

Source: BLM, Medford District

the already established north-south route. Unfortunately, there are few if any identifiable remains from this era.

After the initial gold discoveries in California in 1848, new strikes were made at Galice and Jacksonville in 1851 and on the Illinois River in 1852. Hordes of fortune seekers soon established thriving settlements at Jacksonville, Waldo, Allentown, and Browntown. The miners were followed by farmers who took up arable lands along the Rogue and other interior valleys. Lumbering, for local use only, also began during this period. Inevitably this population growth was to lead to hostilities with the aboriginal inhabitants. There were numerous outbreaks of violence and hostility on both sides which culminated in the defeat of the Indians in the spring and early summer of 1856. In June of 1856 all of the Indians in the area were removed to the Siletz reservation in northwestern Oregon.

Identified physical remains of this period are few. The early mining centers of Waldo, Allentown, and Browntown are gone, and there is little to mark the battlefields and encampments of the Indian wars.

By 1860 nearly all of the good lands in Oregon and elsewhere on the Pacific coast had been settled, the easier gold deposits had been worked, the Indians pacified or removed. The period from 1860 to 1884 has been subject to little historical research or interpretation, it appears that the entire area settled into a relatively prosperous broad spectrum agriculture. While mining declined during the 1860's, gold was one of the major export items as an

exchange for goods not produced locally. During the 1870's and 1880's, less accessible gold deposits were worked and Chinese immigrants reworked some of the old areas. Old Channel Hydraulic Mine, located on a "high level" gravel terrace paralleling Galice Creek and the Rogue, was at its peak during this period. In the mid-1880's hard rock or quartz mining activity increased.

Placer mining in the late 1800's left many boulders and debris in the gulches and creek channels of Southwestern Oregon (Galice Creek)

Major routes of travel continued to be the old north-south route and the route to the coast and Crescent City which followed the present route of U.S. 199. Very few remains of the period have been documented.

Construction of the Oregon and California Railroad (which became the Southern Pacific in 1888) from Portland to the San Francisco Bay area began in 1868. Trains were running as far south as Eugene by the following year. Thereafter, financial and technical difficulties mounted and the line did not reach the Rogue Valley until 1884. The major effect of the railroad, when it was finally completed, was to tie the local economy to the national. The advent of rail service initiated shifts in population, reflected in the movement of the county seat from Kerby to Grant's Pass in 1886. Specialty agriculture developed in order to compete in markets outside the valley. Mining activity continued strong. By 1905 the Almeda mine on the north bank of the Rogue was being developed and a smelter was built in 1908. The ore deposit on which this mine was located was especially valuable for copper, but also contained silver, lead and zinc. This mine had more than a mile of underground tunnels, one of which ran under the Rogue (Winchell, 1914).

A lack of rail lines into the western portions of the county hampered the growth of agriculture and the timber industry. In 1911 construction was begun on the California and Oregon Coast Railroad from Grants Pass to the coast. However the railroad was only completed to a point about ten miles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southwest of the city. Other than mining areas, there are few inventoried sites from this period.

The present era has brought extensive changes to the area both physically and socially. Logging on a commercial scale is a recent arrival and the elements of pre-mechanized logging which add to the history of other parts of the nation are not really a part of local tradition. Mining is on the decline and much of the remains of past life styles have been obliterated.

Table 2-33 lists the identified historical sites that might be impacted, directly or indirectly, by some identified aspect of the proposed action. The general location of these sites is shown in Figure 2-25. The table reflects the present state of knowledge; undoubtedly other sites will be added to the list as they are recognized as having significant historical interest. Furthermore, a number of historical sites not included in this listing would not be affected by the proposed action. These are predominantly currently occupied urban areas (Grants Pass, Williams, Kerby, for example) with buildings or residences of historical interest. Historical sites are protected by the same stipulations as archeological sites, and a thorough survey to identify them so they can be protected must be accomplished before any ground-disturbing or title-alienating activity can be undertaken.

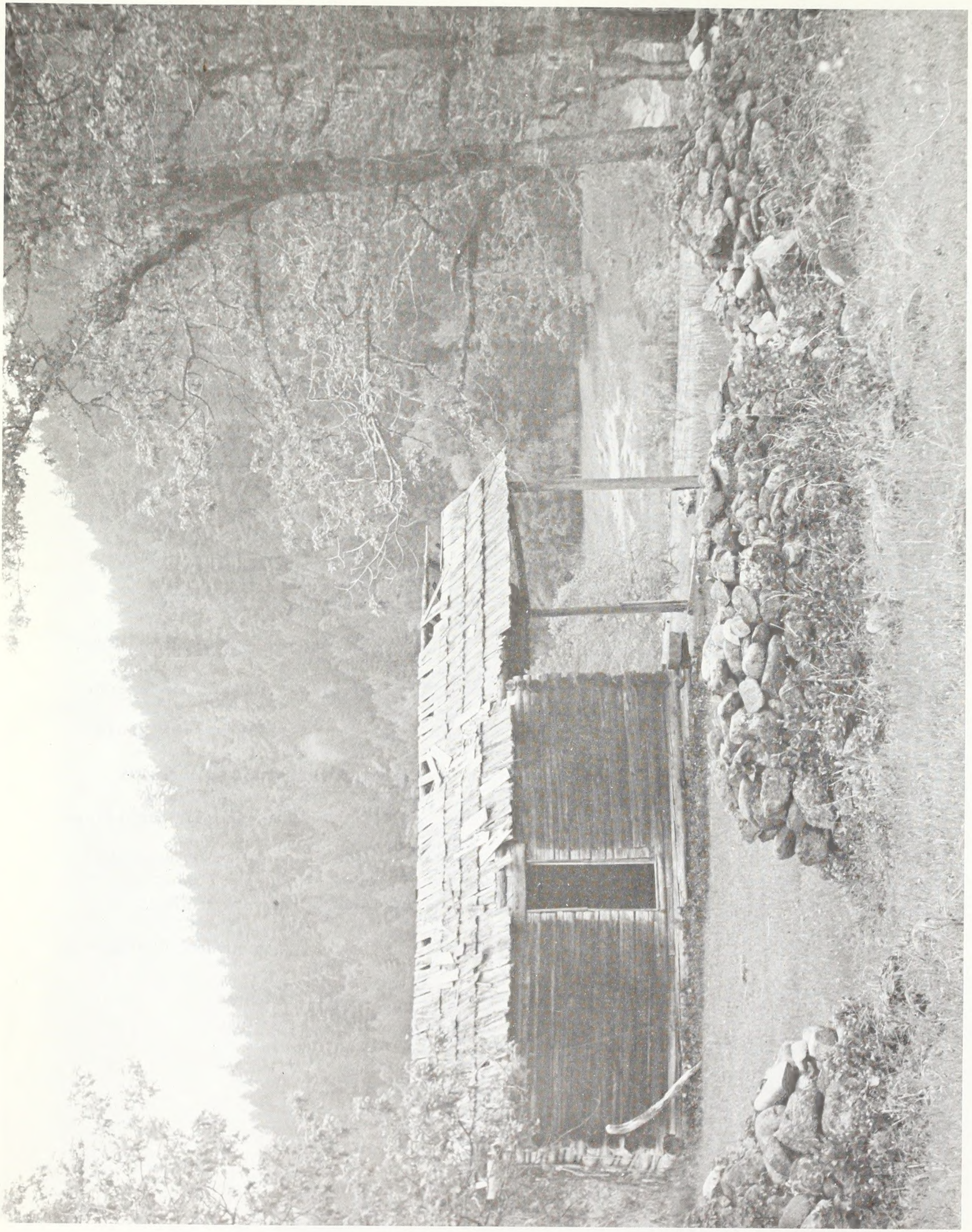

TABLE 2-33

Historical Sites Within the Josephine SYU

Historical Sites National Register	Attributes/Condition	Jurisdiction	Significance rating
Rogue River Ranch (on Register)	Turn of the century farmstead in good condition	Public	S-1
Whiskey Creek (on Register)	Miner's cabin built in 1880's. In good condition	Public	S-1
Wolf Creek Inn (on Register)	An important stop on the early North-South route. Dates from 1856, used as hostelry. Good condition.	State	S-1
National Register Pending Status			
Grave Creek Bridge (approved by State Historic Preservation Office for nomination to National Register)	Covered bridge in very good condition, 1920 last remaining covered bridge on Pacific Highway and in Josephine County.	Josephine Co.	S-2
Non-National Register			
Townsites			
Allen Town	Almost obliterated: Occupancy trespass Mining Frontier, 1852	Public	S-2
Browntown	Obliterated. Once a mining town. Occupancy trespass, 1852	Public	S-4
Waldo Townsite	No remains of town: Monument has been erected by Josephine County Historical Society, 1853	Private	S-2
Golden	Frame buildings in good condition. Marker erected by Josephine Co. Historical Society.	Private	S-2
Sucker Creek Townsite	1853 and 1856, Mining frontier	Private	S-4
Perkins Ferry	First permanent white settlement in the Basin; near Grants Pass	Private	S-4

Table 2-33 (Continued)

Cemeteries			
Allen Cemetery	Good	Public	S-2
Waldo Cemetery	Some graves identifiable	Public	S-2
Tuller Graves	Being researched. Graves inadvertently destroyed during road construction prior to BLM jurisdiction	BLM	S-4
Deer Creek Cemetery	Some graves identifiable	Public	S-2
Grave Creek Cemetery	Some graves identifiable	Public	S-3
Transportation Routes			
California & Oregon Coast Railroad	Portions of roadbed remain. Operated 1911-1956.	Multiple	S-4
Jacksonville-Crescent City Trail	1860, Mining Frontier and Transportation route	Multiple	S-4
Twogood & Harkness Stage House NE of Grave Bridge	Original structure erected 1857	Private	S-3
Applegate Trail	Original Applegate Trail of 1846 was the early day route through southern Oregon.	Multiple	S-1
Oregon-Calif. Stage Road	Major frontier transportation route	Multiple	S-4
Mining/Gold Workings			
Benton Mine	Partial remains of gold mine, 1893, wolf creek vicinity	Private	S-3
Galice & old Channel Mine	Existing resort area & richest hydraulic placer mines, 1852, scattered debris from placer and hydraulic mining evident	Private	S-3

Table 2-33 (Continued)

Hansen Mine	Some buildings still standing. Occupancy trespass problem.	BLM	S-3
Cohen Mine	Extant mining claim Cabin & mining equipment dates back to 1920 or earlier	Private	S-3
Almeda Mine	Mining frontier 1908-1916; wolfcreek vicinity	Private	Undetermined
Waldo gold workings	Gold workings of the 1850's; few remains	Private	S-3
Democrat Gulch gold workings	Gold workings of the 1850's; few remains	BLM	S-3
<u>Forts</u>			
Fort Lamerick	An encampment used in 1856. No visible remains.	Private	S-4
Fort Briggs Site	Near Sucker Creek/Cave Junction, 1855-56; military and indian affairs.	Private	S-4
Fort Leland	On Grave Creek; 1855-56; Military and Indian affairs Only remnant is the well which served this stockade.	Private	S-4
Fort Vannoy	1855-56; Military and Indian Affairs	Private	S-4
<u>Battles</u>			
Battle of Eight Dollar Mt.	Site of Rogue River Indian War Battle	Private	S-4
Battle of Galice Creek	Site of Important Rogue River Indian War Battle	Private	S-4
Battle of Hungary Hill	Site of Rogue River Indian war battle of 1855; five unmarked graves remain in T.345 R.6W Section II.	BLM	S-4

Table 2-33 (Continued)

Other Historic Sites

Kerby Museum	Josephine C. Museum includes restored late 19th century home. Classic architecture, late 1870's	Josephine Co.	S-2
Mt. Peavine Lookout	Lookout tower in good condition	BLM	S-2
Waldo Lookout	Lookout tower still in operation	State	S-2
Sutherland Brick Works	Ruins of brick kiln	Private	S-3
Zane Gray Cabin	Good. Residence of Zane Gray	Private	S-2
Chinese Rock Works (Galice Creek Mine Tailing)	Galice Vicinity, late 1800's, cultural immigrations. Debris from hydraulic and placer mining which commenced in 1852.	Private	S-3
Indian Mary Park	Granted to Indian Mary in 1894 in recognition of gratitude to her father, Umpqua Joe, who saved white settlers from a planned massacre.	Josephine Co.	S-4

CRES ratings S1 to S4 for historical resources are slightly different than those for archeological. Definitions are as follows:

S-1. National Register Significance. In general, S-1 properties show a clear potential for yielding, or have yielded, highly significant scientific/educational information and are clearly important in terms of national, State, or local history. Normally the S-1 rating will be assigned to those properties which are in relatively good condition, and are unique or representative, and/or have important associations.

S-2. Mid-Significance. Assign S-2 rating if resource does not satisfy S-1 requirements. S-2 properties are usually in only fair condition. They are not particularly unique or representative, nor do they have important associations. Many recently abandoned western homesteads, small mining camps, cemeteries, railbeds, roads and trails will fall here.

S-3. Low Significance. Assign the S-3 rating if the main worth of the property is its potential for contributing data in regards to solving larger problems of areal human usage and environment. Properties such as dumps, isolated domestic and non-domestic buildings and materials, small mining operations, will often fall here.

S-4. Data Property. The S-4 rating is only assigned to resources that have no physical remains in the field and/or have lost field integrity.

Source: Bureau Planning Documents

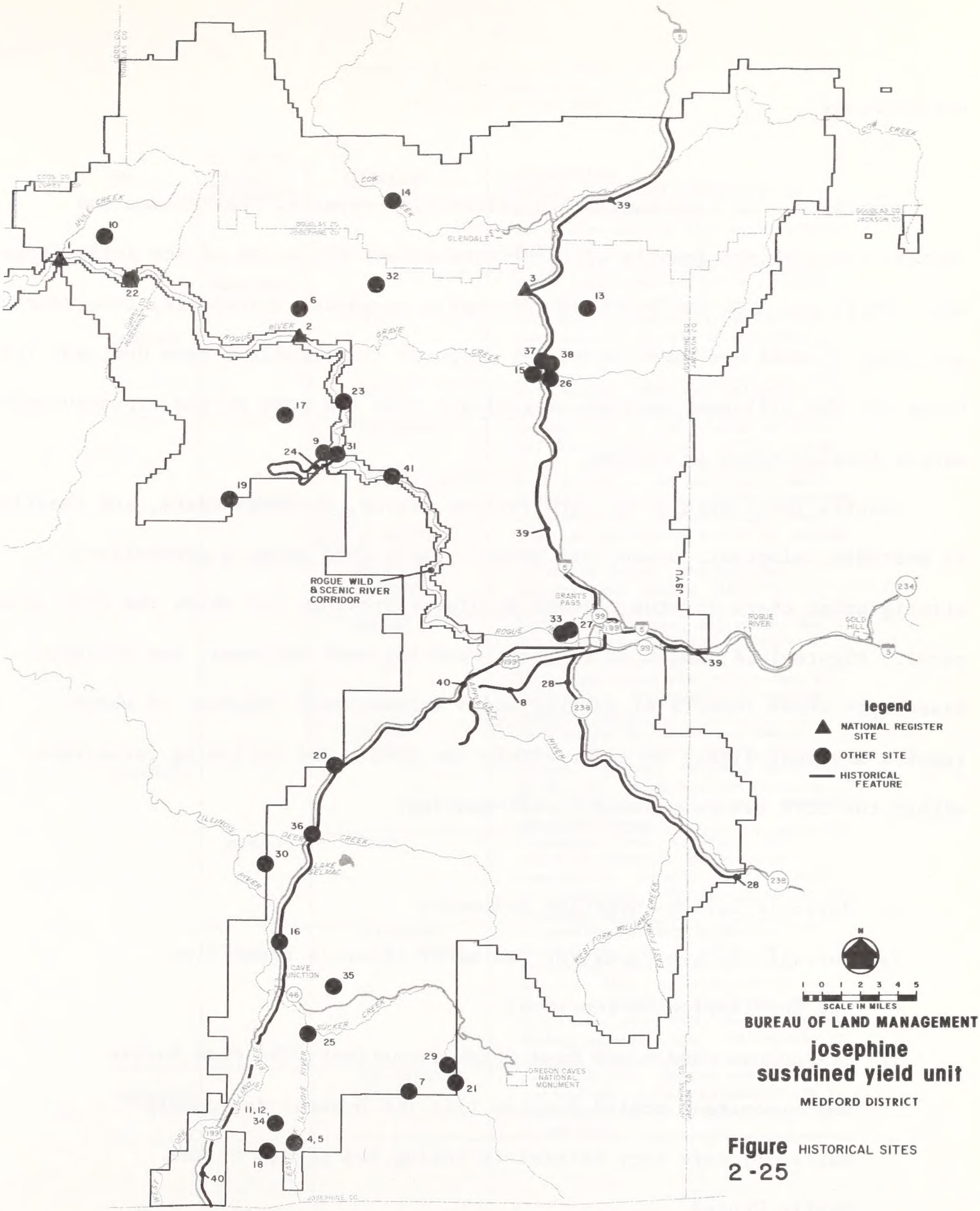

Figure 2-25 HISTORICAL SITES

Paleontology

Fossils are an important and nonrenewable resource. Vertebrate and certain invertebrate fossils are protected within the scope of the Antiquities Act. While the JSYU has not been thoroughly surveyed, vertebrate, invertebrate, and plant fossils are known to occur. Figures in Appendix F show dominant life forms for the different periods of geologic time and some of the representative marine fossils found in Oregon.

Fossils found within the JSYU include leaves, mollusca casts, and fossils of mastodon, elephant, bison, and horse. Table 2-34 shows a generalized stratigraphic chart for the Klamath Mountains Province (of which the JSYU is a part). Figure 2-26, which shows fossil-bearing rock outcrops, was devised based upon known reports of fossils and a professional judgment of where fossils are most likely to occur within the JSYU. The following formations within the JSYU are considered fossil-bearing:

1. Jurassic Galice formation Sediments
2. Jurassic Dothan formation Sediments (Fossils identified as Buchia piochii reported)
3. Cretaceous Riddle and Days Creek formations (The clam Buchia and ammonites, coiled fossils like the present day pearly Nautilus, were very helpful in zoning the strata of the Myrtle Group)
4. Cretaceous Hornbrook formation

Table 2-3 4

Generalized Stratigraphic Chart for the
Klamath Mountains
(McKee 1973, Ramp 1969)

ERA	SYSTEM OR PERIOD	FORMATION	DESCRIPTION
CENOZOIC	QUATERNARY		Bench gravels and alluvium along streams and glacial moraine and till. Auriferous gravels (in former stream channels)
	TERITIARY		Old gravels - on Klamath peneplain
			Small intrusions of dacite porphyry and nepheline syenite
		TYEE	Coal-bearing shales, sandstone and conglomerate extends as far south as Bald Knob on north side of Rogue River.
		UMPQUA	Well-bedded sandstone, siltstone, and some massive conglomerate
MESOZOIC	CRETACEOUS	HORNBROOK	Marine beds in Medford-Ashland area and Upper Grave Creek: Arkosic sandstone, siltstone, and conglomerate
		Myrtle Group: DAYS CREEK, RIDDLE	Dark siltstone and sandstone; minor basalt and andesite, chert, limestone, conglomerate. Marine Myrtle Creek area and equivalent strata in coastal belt.
	JURASSIC	NEVADAN OROGENY	Intrusive rocks: periodotite, serpentinite, gabbro, diorite, granite, pegmatite
		GALICE	Dark gray mudstone, siltstone, and fine-grained sandstone. Marine fossils. Metamorphoses locally, including Colebrooke schist east of Gold Beach. Widespread in eastern Jurassic Belt.
		DOTHAN	Dark graywacke sandstone, lesser shale, conglomerate, chert, pillow basalt. Marine. Probably equivalent to Galice. Forms Western Jurassic belt from near Roseburg past Brookings into California.
		ROGUE	Submarine flows, breccias, and tuffs of basaltic and andesite composition, locally weakly altered to greenstone. Widespread in eastern Jurassic belt.
	TRIASSIC	APPLEGATE GROUP	Metasediments, metavolcanics, and intrusives. Age of lower part uncertain. Mostly andestic and basaltic flows and pyroglastic rocks. Sandstone, conglomerate, siltstone, limestone, chert. Marine. Weakly metamorphosed. Widespread in eastern Klamath Mountains.
PALEOZOIC		PRE-TRIASSIC SCHIST	Age uncertain. Marine sedimentary and volcanic strata metamorphosed to hornblends and mica schist. Southwest of Ashland.

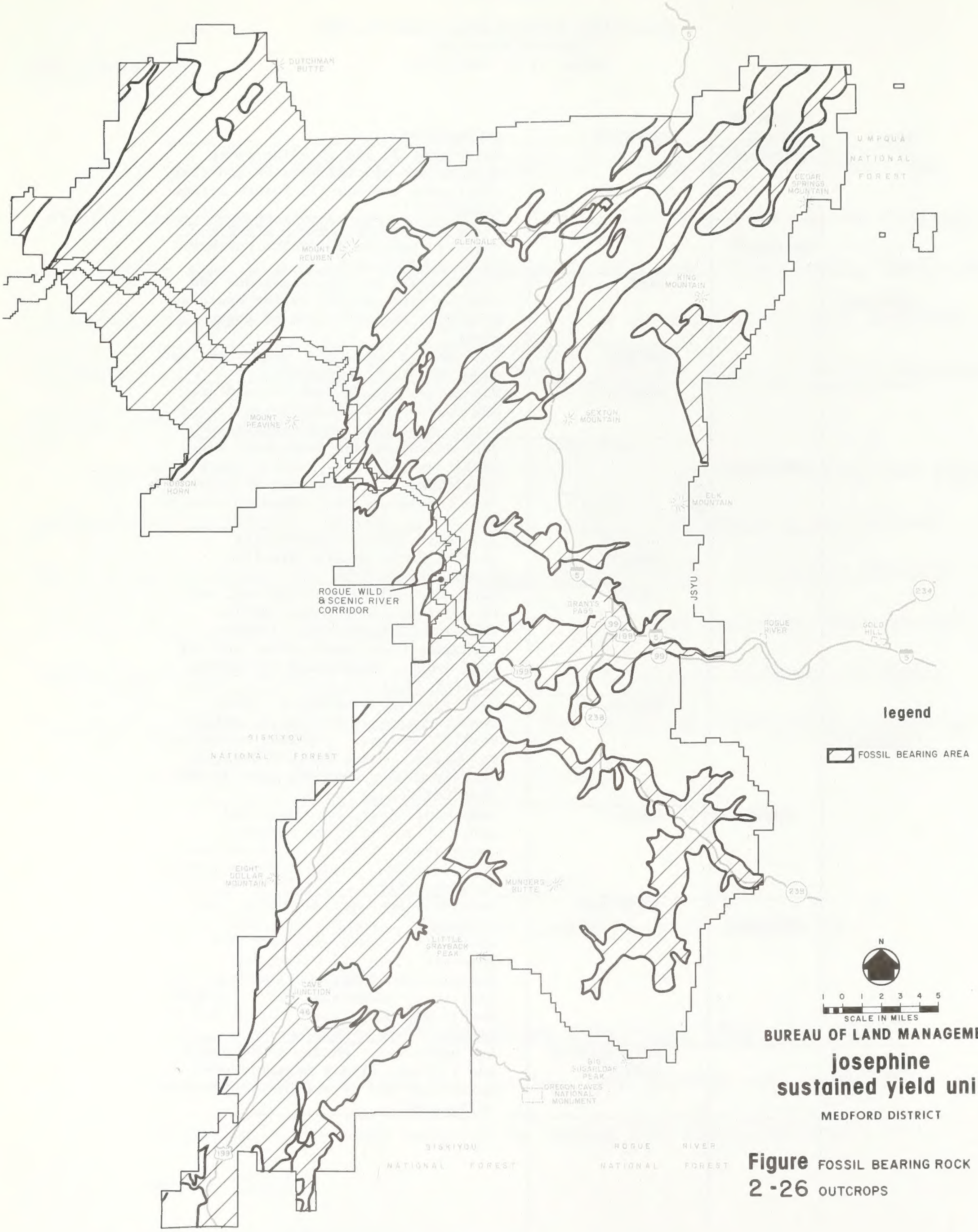

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Figure 2-26 FOSSIL BEARING ROCK OUTCROPS

5. Eocene Umpqua formation

6. Pliocene-Pleistocene bench gravels

7. Recent Alluvium

None of the known fossils within this area are of remarkable interest. However, all reports of fossil-bearing deposits are required to be checked by qualified personnel to avoid destruction of such resources.

2.1.3.3 Visual Resources

The landscape of the Klamath Mountain physiographic region, in which the Josephine SYU is located, is predominantly rugged. Figure 2-9 shows land relief in the SYU. Although the average elevation of the mountains is about 5000 feet, some peaks in the southern part of the SYU, in the Siskiyou Mountain Range, rise to over 6500 feet. Steep slopes, narrow canyons and broad valleys associated with the Rogue River and Cow Creek watersheds are the natural landforms on which human use occurs and which can be viewed from roads, trails, or rivers.

Characteristic Landscapes

Four different characteristic landscape associations are discernible within Josephine SYU: upland timber, narrow corridors, Rogue River Canyon, and valley bottoms. Figure 2-27 shows the location of each and characteristics are shown in Table 2-35.

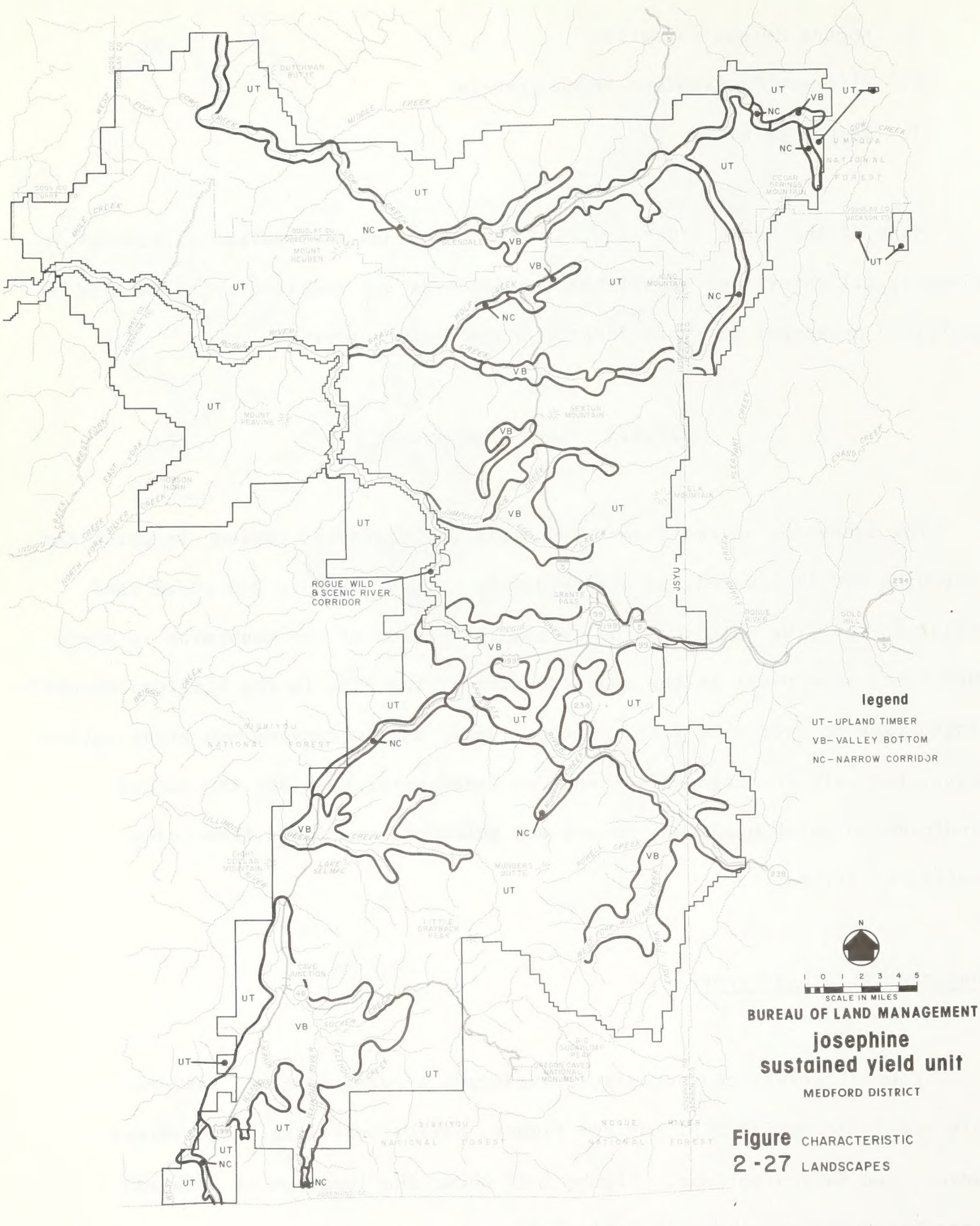


Figure 2-27 CHARACTERISTIC LANDSCAPES

Table 2- 35

Visual Features of Characteristic Landscapes within the JSYU

	FORM	LINE	COLOR	TEXTURE
UPLAND TIMBER	Form is quite dominant; Mountains with narrow ridgelines; slopes and canyons hardwoods create a variety of forms at lower elevations	Natural patterns are relatively triangular; Narrow horizontal ridgelines; steep angled slopes and incised canyons with vertical line influence	Timber portrays greens and browns; soils are light tan to red and highly reflective of light when disturbed.	Vegetative texture is dominant; very even, rock outcrops apparent only in river canyons or along ridge tops.
NARROW CORRIDORS	Narrow valley with a stream of gentle gradient cascading water a strong feature. More variation than in upland timber landscape	Steep slopes within the recreational portion of the Rogue; gentle gradients in other areas; surface drainage patterns reinforce the dominance of vertical line.	Many colorful shrubs and hardwoods; more color variation than in upland timber landscape.	Valleys characterized by the presence of timber and water; strong vegetative texture
ROGUE RIVER CANYON	A steep canyon with a narrow corridor dominated by spectacular scenery of water, rock outcrops, and vegetation.	Steep canyon walls reinforce vertical line dominance; shorelines reinforce line.	Great variety in color; black, green, reddish brown rock outcrops; south-facing slopes have hardwoods interspersed with openings of red-brown earth.	Rock outcrops, north facing slopes have more evenly-textured vegetation
VALLEY BOTTOMS	Gently rolling landforms; man-made modifications apparent; broad valley floors.	Geometric patterns and ridgetop openings denote obvious man-made modifications.	Great color variety as a result of variety of landuses.	Great variety of texture as a result of landuse variety

Upland Timber

The upland timber characteristic landscape is the predominant landscape association of the Josephine SYU. Mountains with narrow ridgelines, very steep slopes and many incised canyons are dominant features. Surface texture, however, is very even; rock outcrops are apparent only in the river canyons or along ridge tops.

Soils are colored light tan to red and are highly reflective of light when disturbed, a fact that makes road construction and cable or tractor logging skid roads contrast sharply with the natural landscape. Forest management activities of clearcutting and shelterwood timber harvesting with associated road systems create strongly contrasting geometric forms and vegetative texture changes that are not harmonious with the natural landscape.

Vegetation is a mixed conifer forest type of pine and fir with associated hardwoods, primarily oak, madrone, and chinkapin. At the lower elevations conifers are dominant, but large areas of oak and madrone are discernible. The hardwoods create a variety of natural forms not evident at higher elevations within the upland timber landscape and add greater visual variety and interest with different textures and colors. Madrone is an outstanding example with its shaggy, cinnamon-colored bark. At higher elevations vegetation is almost entirely mixed conifer. Hardwoods, while present as scattered trees, are not a visually apparent element of the vegetation. Here there is a noticeable

difference in tree heights, branching patterns and foliage colors in light green pines to dark-colored fir trees as shown below.

Ridgeline roads offer panoramic views of the rugged terrain and valley bottoms, illustrated in the following photo. Structures are absent or not very noticeable in the upland timber landscape. Fire lookout towers are far away and painted in muted colors.

Narrow Corridors

This characteristic landscape, found as islands within the upland timber landscape, is typified by a narrow valley with a stream of gentle gradient. Alluvial terraces along the stream have been utilized to locate roads for access to upland timber areas or to traverse topographic barriers, as shown in the following photo.

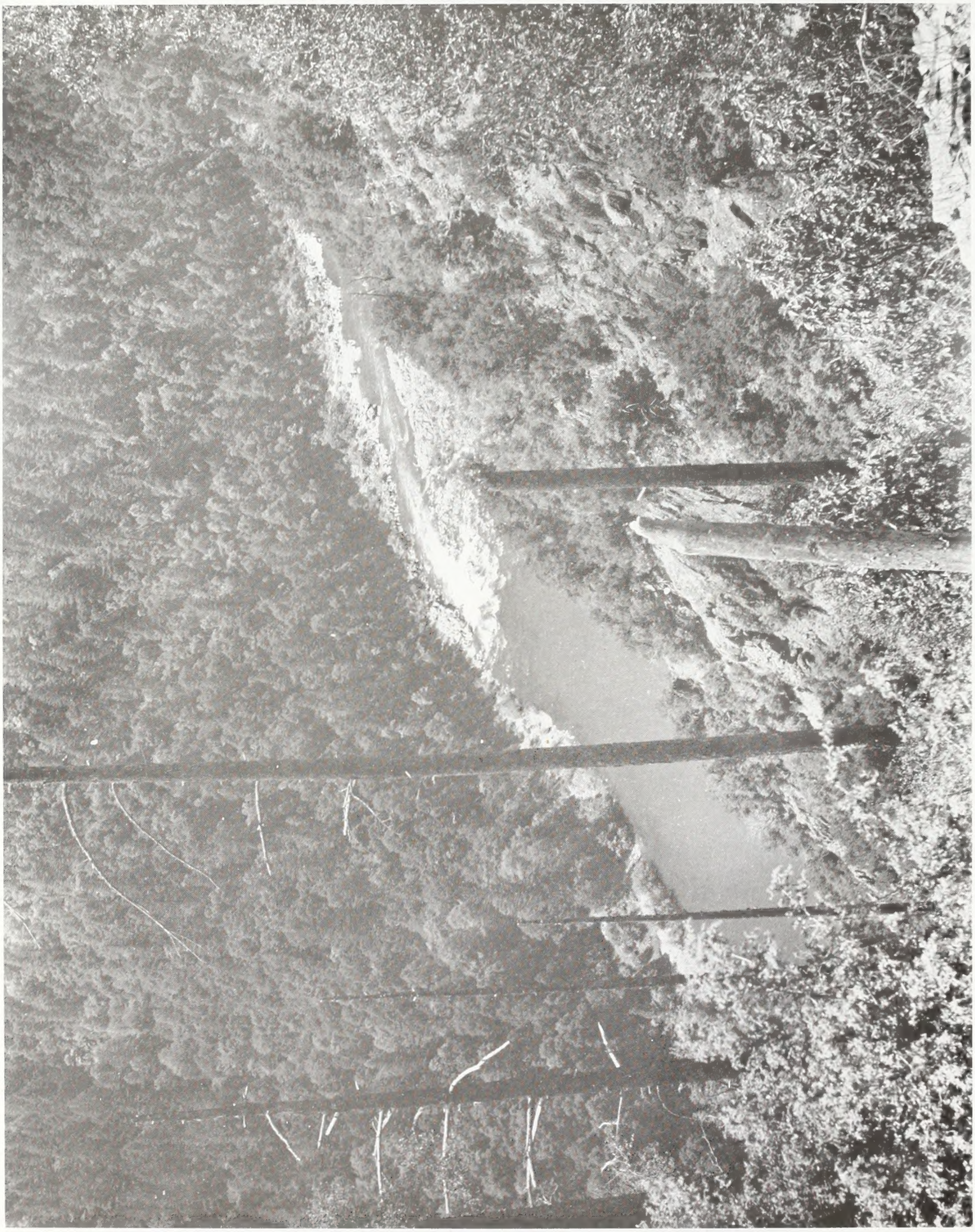
In addition to the roadways, this landscape is distinctive because of its rugged, constantly changing features within an enclosed scene. The general presence of water cascading through the canyon bottom becomes a strong feature of both sight and sound. Plentiful water results in a multitude of fine textured shrubs and hardwoods, providing more variation of form and color than can be found within the upland timber landscape.

Structures in this landscape are roadways with related culvert and bridge installations. Culvert pipes or bridges which do not blend with the natural landscape in design or color may create a visual intrusion. Timber harvesting practices in this characteristic landscape have a tendency to create unsightly blockages of logging debris along the creek bottoms.

The recreational portion of the Rogue River from Hellgate to Grave Creek is included in this landscape type. Steep forested slopes and expanses of dark-colored rock enframe the river. Structures include salmon boards which jut from the river bank, recreational homes, and recreation sites with boat launch ramps and associated facilities.

Rogue River Canyon

The Rogue River is the most interesting scenic feature in the Josephine SYU. From the eastern boundary of the SYU to Hellgate, the Rogue is included in the valley bottom characteristic landscape; from Hellgate to Grave Creek Bridge, the river is included in the narrow corridor landscape. The section of the Rogue classified as "wild" has a distinct character of its own.



Beginning at Grave Creek, the Rogue River Canyon can be viewed only from the Rogue River Trail or from the river itself. The scenery becomes spectacular. The landscape is primarily enclosed as the steep canyon walls limit horizontal views. Form and texture are varied, with forested slopes, rock outcrops, and gravel bars. Rock outcrops vary in color, with blacks, greens, and reddish browns predominating. Vegetation varies depending on slope aspect; northfacing slopes tend to be more even-textured with mature conifers, while southfacing slopes are more nubbly with shrubs and oaks interspersed with openings of red-brown earth. The river itself is a focal point and adds to sight and sound with many rapids and waterfalls. Along the river are several historical buildings such as Zane Grey's Cabin, Whiskey Creek Cabin, and Rogue River Ranch. These add to the scene and are not considered to be intrusions.

Valley Bottoms

This characteristic landscape encompasses ancient meander plains and alluvial areas adjacent to significant streams. The association includes not only broad valley floors but rolling hills within and peripheral to the valley. Water is present within this landscape but it is not always a dominant feature due to vegetative screening and road placement.

Vegetation is the dominant feature of the valley bottom landscape. Human settlement has resulted in great variety, with crops, irrigated pasture, shrubs, hardwoods and conifers. An interesting mosaic has been created

due to different land uses of the various owners. This great variety of vegetation creates multitudes of color and textures throughout the seasonal changes of spring, summer and fall.

The valley bottom is predominantly in private ownership or under the control of local and state governments. Structures are commonly present and have a high impact on views in this landscape. Older structures exemplary of early settlement may have great cultural and scenic value. Poorly maintained structures and areas of greater development density may leave a negative impression.

Scenic Values

All public lands are assumed to have some scenic value. Some areas are more scenic than others. While esthetics and scenic values are a matter of personal judgement and individual taste, BLM has devised criteria to evaluate scenic quality (BLM Manual 6310). The parameters are topography, color (of soil, rock vegetation, etc.), water, vegetation, uniqueness, and absence or presence of intrusions. Variety within these parameters gives an area more scenic value. The presence of water is considered to be very important. All lands within JSYU regardless of ownership (855,985 acres) were rated according to the procedures described in BLM Manual 6310. Figure 2-28 shows the scenic quality classes.

Class A Scenery

Highly scenic, distinctive or unique landscape (Class A) has been identified along the Rogue Wild and Scenic River. The high scenic value of this portion of the Rogue was a factor leading to inclusion of the river within the National Wild and Scenic River System. Water hurtling between canyon walls, rock outcrops, rapids, a variety of vegetation along the river, historic sites, and steep, forested hills which are unroaded and unlogged are typical features included in the more than 15,500 acres of Class A scenery.

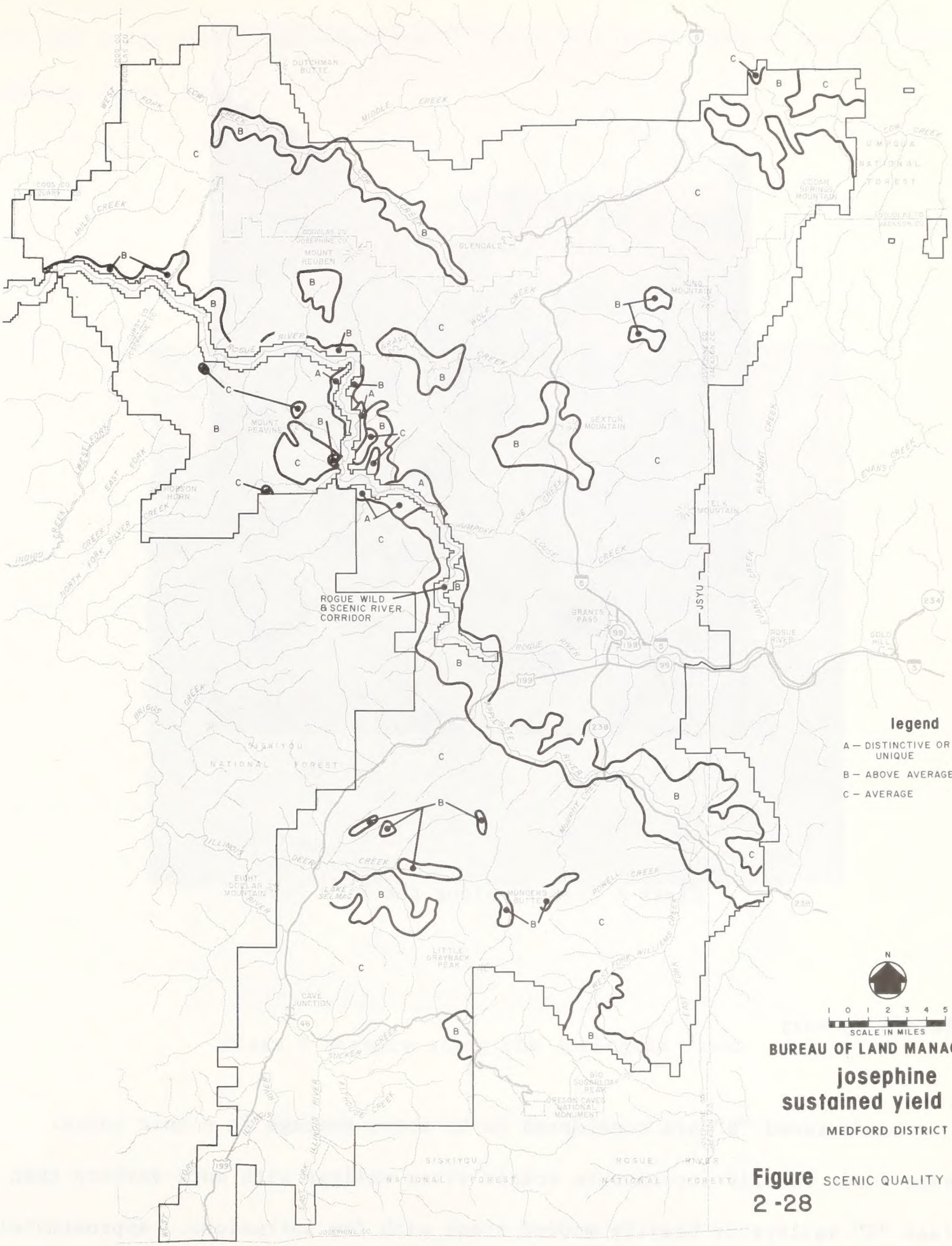


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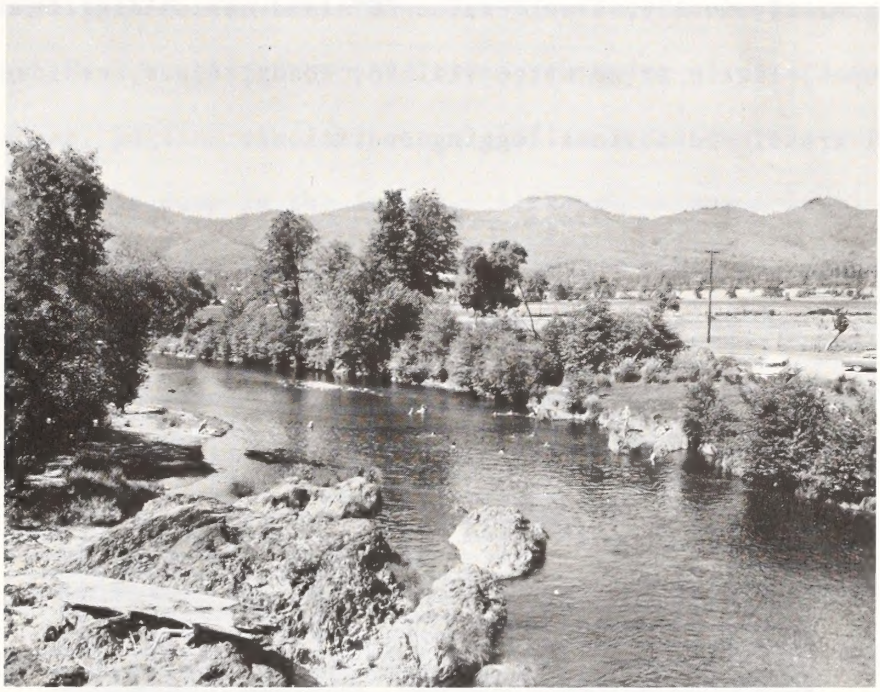
Figure 2-28 SCENIC QUALITY CLASSES

Class A Scenery along the Wild Rogue

Class B Scenery

Lands rated "B" are considered to be above average in scenic value. These lands usually incorporate scenic river valleys with more variety than Class "C" valleys or heavily wooded areas with few intrusions. Approximately

146,000 acres within the Josephine SYU have been identified as having above average scenic value.



Class B Scenery along the Applegate River

Class C Scenery

Most of the JSYU (825,725 acres) is classed as "C", which is average scenic quality for the region. If compared with scenery in other physiographic parts of Oregon or the United States, this acreage might draw a higher rating. However, the bulk of the Josephine SYU is usually comparable with non-coastal Western Oregon. Typically, scenic value "C" land has rolling topography, forested slopes, little or no water visible, roads, scars, residential and agricultural areas, and obvious logging operations.

Typical Class C scenery in the JSYU

2.1.3.4 Noise

Ambient noise is the all-encompassing noise within a given environment, representing a composite of sounds from all sources, near and far.

A majority of public land within the SYU is devoted to timber production, and noise levels generated within the forest reflect a composite of characteristic sounds. Wind rustling through leaves, chirping birds and insects, gurgling streams, bugling elk, and other similar noise sources contribute to ambient noise levels deep in the forest. Although no noise level surveys have been conducted within the SYU, other data from similar areas indicate that maximum ambient levels average 35-40 decibels measured on the A scale (dBA). This range is in the faint to moderate level of human audibility (AMF, 1971).

Human intrusion into an environment generally brings about an increase in noise. The increase is more dramatic if motor vehicles are involved. For example, a diesel truck may generate 80-90 dBA, audible for 50 feet from the roadway (EPA, unpublished document). An off-road recreation vehicle may generate noise levels that approach those of the diesel truck, depending on the type of muffler used, size of engine and the speed of the vehicle.

Logging activities are noisy, as are the supportive construction efforts. Chain saws can be heard for great distances. Logging operations and road construction are temporary noise sources: they contribute to ambient noise levels only for the length of time it takes to build the logging road and

harvest timber. Sources of noise generation associated with timber harvest include dozers, skidders, chain saws, yarders, loaders, heavy and light trucks, radio communications and human voices.

Dailey and Redman (1975) examined the frequencies and intensities of eleven human-related noises often associated with roadless area use. These intrusive sounds contrast with natural background noises one would expect to find outdoors (birds, wind, leaves rustling, water). Factors were listed as determinants of how far intrusive noise will travel before being masked by background noise level (Harrison, 1974). These factors were the loudness and pitch of the intrusive noise and the background noise, and environmental factors such as land form barriers which decrease intrusive noise loudness.

Figures 2-29 and 2-30 illustrate the intensity and frequencies, respectively, of the eleven noises. The sound levels for chainsaw and skidder activity at 50 feet were provided in a study by the Canadian Forestry Service (D.V. Myers, et.al., 1971). Figure 2-31 compares noise levels for chainsaws and skidders. The greater the intensity (loudness) of a noise and the lower its frequency (pitch), the farther it will travel. High intensity noises include the gunshot, chainsaw, skidder, yell, whistle, and trailbike. Low frequency sounds recorded were the guitar, trailbike, and wood chopping. Chainsaw and skidder activity were also determined to produce great variations in frequency. Figure 2-32 compares octave-band noise levels for all logging machines with average octave-band levels for all chainsaws and all skidders tested in the Canadian Forestry Service study.

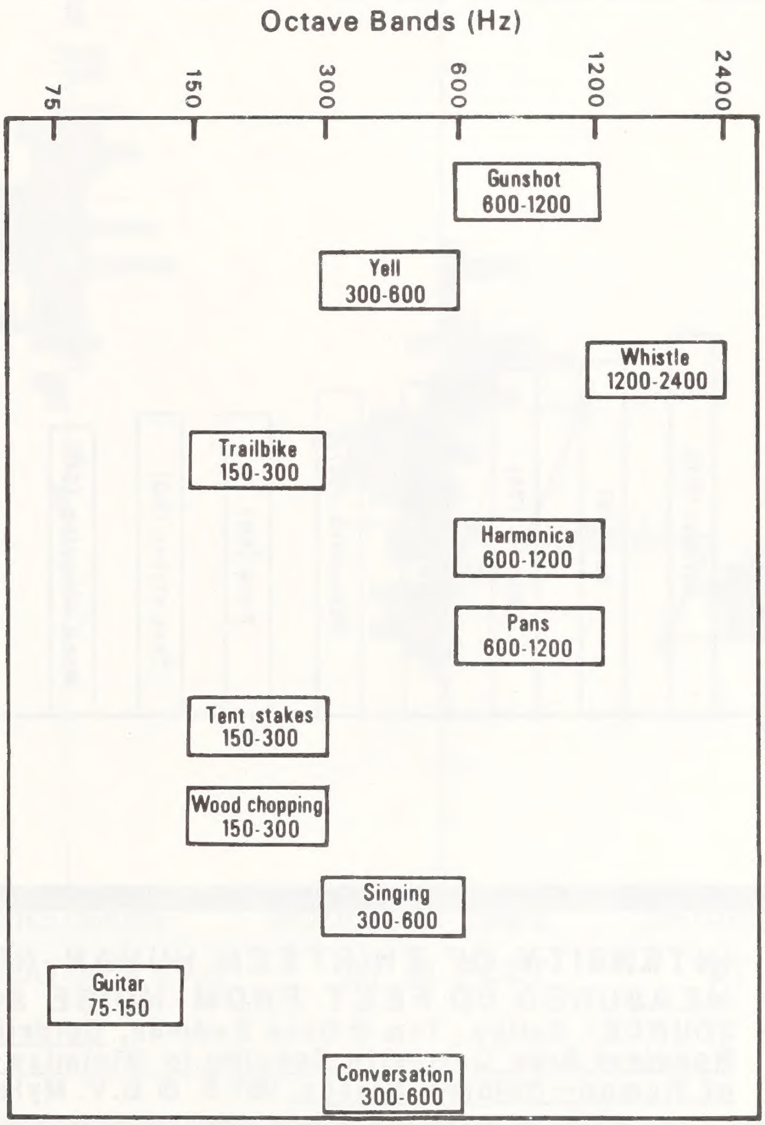


Figure 2-29 OCTAVE BAND FREQUENCY OF ELEVEN HUMAN NOISES

SOURCE: Dailey, Tom & Dave Redman, Guidelines for Roadless Area Campsite Spacing to Minimize Impact of Human-Related Noises, 1975.

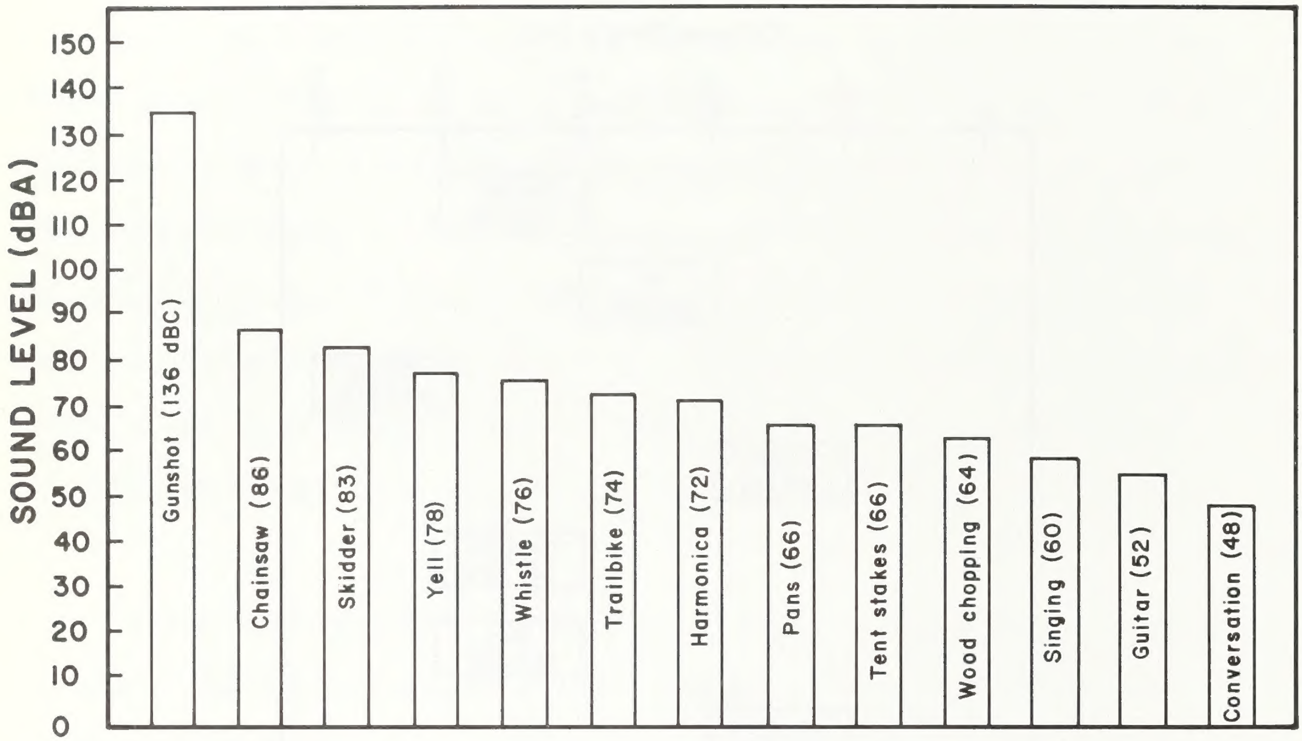


Figure 2-30 INTENSITY OF THIRTEEN HUMAN NOISES • MEASURED 50 FEET FROM NOISE SOURCE
SOURCE: Dailey, Tom & Dave Redman, Guidelines for Roadless Area Campsite Spacing to Minimize Impact of Human-Related Noises, 1975 & D.V. Myles, 1971

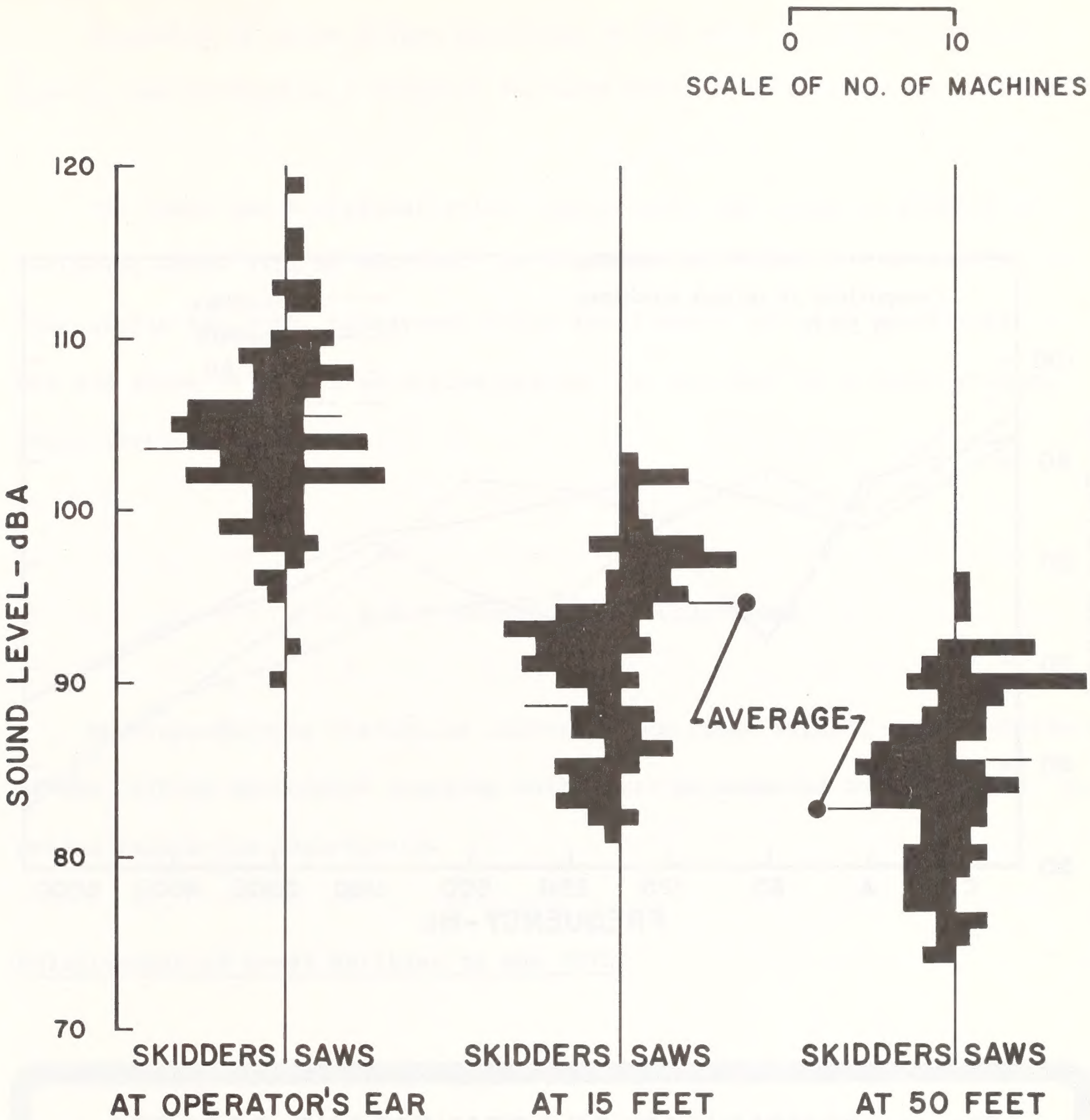


Figure 2-31 **HISTOGRAMS FOR CHAINSAWS AND SKIDDERS**
SOURCE: D.V. Myles, et. al., 1971

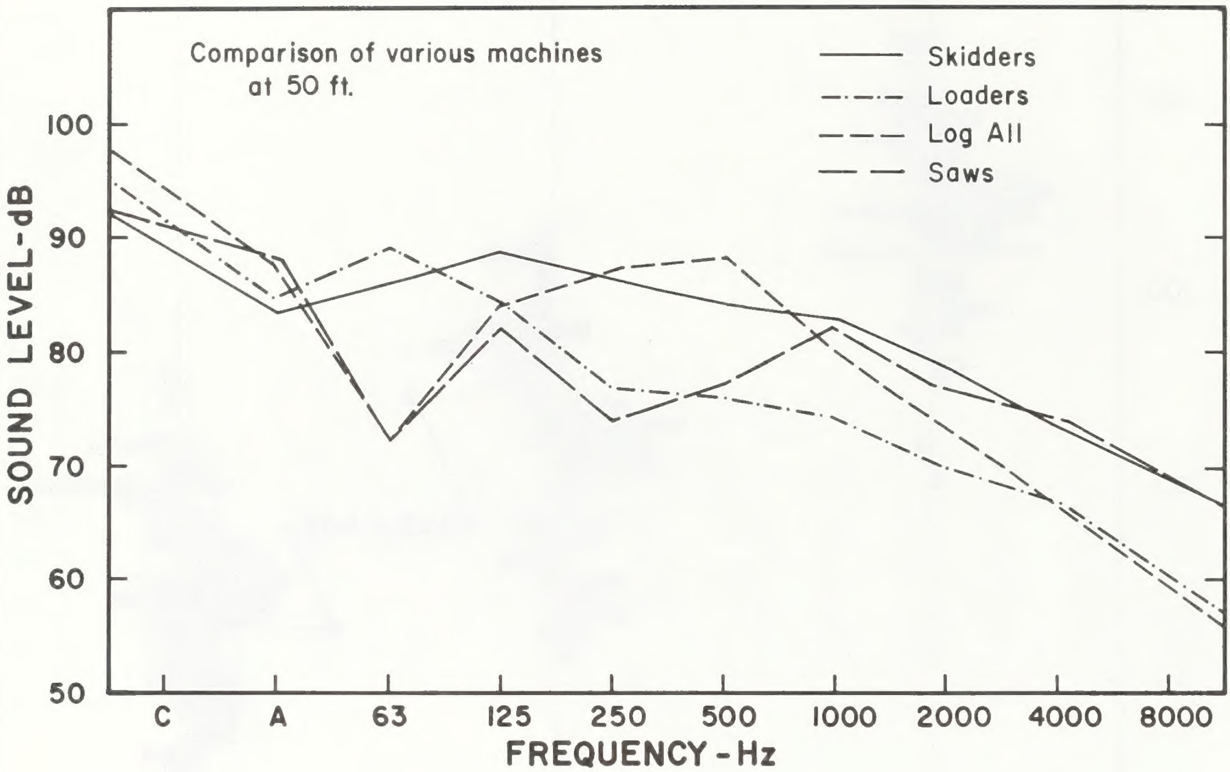


Figure 2-32 COMPARISON OF OCTAVE•BAND SPECTRA FOR ALL MACHINES • AT 50 FEET
SOURCE: Myles, et. al., 1971

Intensity of these noises decreases as the noise projects from its source, and certain environmental features would have attenuating effects.

The lower the background noise, the greater the range over which the intrusive noise will be audible. In a mature coniferous forest similar to that within the JSYU, background noise level under low wind conditions, is 35 dBA and about 30 dBA in an alpine meadow. At the bank of a small stream, noise level is 45 dBA.

2.1.3.5 Socioeconomic Conditions

The introductory discussion addresses questions regarding the relationship of the JSYU to associated counties which must be answered to define the appropriate region for description.

<u>Relationship of Local Entities to the JSYU</u>

Land area and commercial forest area provide an approximate indicator of the relative impact of public land timber programs upon public revenues among counties. Log destinations and trade regions indicate the likely loci of income, employment, population, and public finance impacts.

Regional Analysis

<u>Regional Economic Overview</u>. The southwest Oregon region consisting of Coos, Curry, Douglas, Jackson, and Josephine Counties has an area of 8,147,000 acres. Forests cover approximately 7,022,000 acres, of which 87 per cent or 6,129,000 acres are classified as commercial forest land.

The five counties had a population of about 316,100, 13.5 per cent of the State's total, in July 1976. Major towns include Coos Bay (a seaport), Roseburg, Grants Pass (the Rogue River tourist center), Medford (an important industrial and service center for the Rogue River Valley) and Ashland (whose Shakespearean festival is a major attraction each summer).

Important industries in southwest Oregon are mining, ranching, farming, tourism, and timber. Communities rely heavily on the timber industry for employment. The wood products industry employed approximately 21,000 persons during 1975, seventeen per cent of the area's total employment that year.

Southwest Oregon supplies approximately five per cent of the nation's lumber and one fifth of its veneer and plywood (Bassett, 1977). During 1970-74, the forests in these five counties produced nearly one third of the State's timber harvest. Approximately five per cent of the nation's lumber and one fifth of its veneer and plywood are produced in the area.

Josephine County, like the other four, is essentially rural with an economic structure based on natural resources. Dependence on the lumber and wood products industry, which in turn is dependent on national economic conditions and the availability and cost of residential mortgages in particular, causes repercussion throughout the local economy. Seasonal and cyclical fluctuations exacerbate problems of unemployment and underemployment, historically a major problem for the area. Table 2-36 and Figures 2-33, and 2-34 illustrate these fluctuations.

Land Relationship to JSYU. Josephine County contains 68 per cent of the JSYU area (28 per cent of Josephine County land area). Douglas County contains nineteen per cent of the JSYU area (twelve per cent of Douglas County land area). Curry County contains nine per cent of the JSYU area (four per cent of Curry County land area). Jackson and Coos counties each contain less than five per cent of the JSYU area (less than one per cent of each county's land area). Tables 2-37, 38 and 39 portray comprehensive land ownership data.

The primary destinations of logs harvested from the JSYU in 1973-75 were: Grants Pass (27 per cent) and Merlin (26 per cent), for 53.1 per cent within Josephine County; Glendale (36.4 per cent) and Roseburg (2.4 per cent), for 38.8 per cent within Douglas County; and Medford (8.1 per cent), the only Jackson County destination (Table 2-40). Origins and destinations of logs from all sources are listed in Table 2-41.

Table 2-3 6

Coefficient of Seasonal (Within Year) and Year-to-Year Variation of Employment in Lumber & Wood Products and Total, Josephine and Douglas Counties, 1970, 1974, and 1975.

Year	Sector	Josephine Co.	Douglas Co.
Seasonal			
1970	Lumber & Wood	10%	5%
	All	8	6
1974	Lumber & Wood	14	7
	All	7	4
1975	Lumber & Wood	17	7
	All	9	6
Year-to-Year			
1970-76	Lumber & Wood	11%	7%

Source: Derived from data in Oregon, State of, Oregon Covered Employment & Payrolls by Industry. County, and Month (appropriate years), R.S. publication 21, Employment Division, Salem, Oregon.

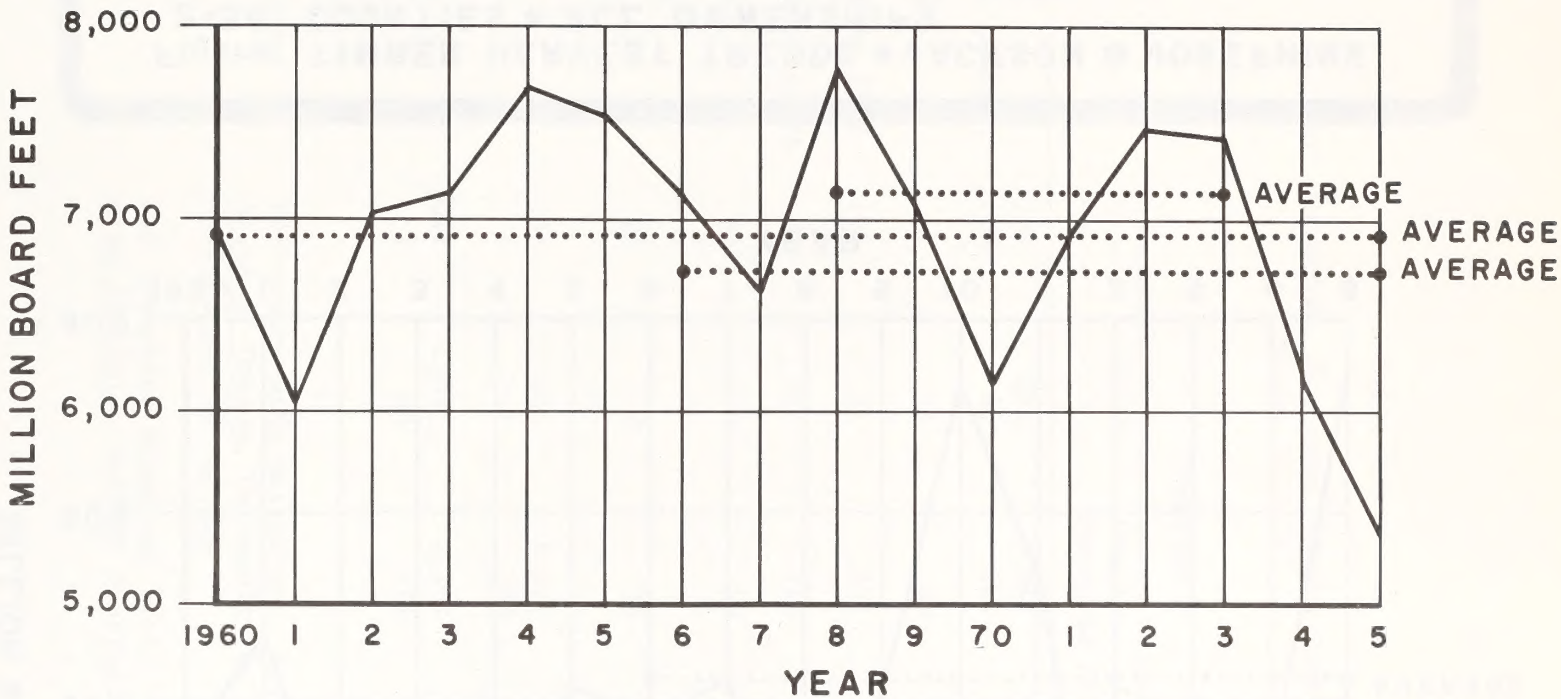


Figure 2-33 TIMBER HARVEST TRENDS IN WESTERN OREGON • ALL OWNERSHIPS
SOURCE: Lloyd, et. al., Jan. 1962 • Dec. 1976

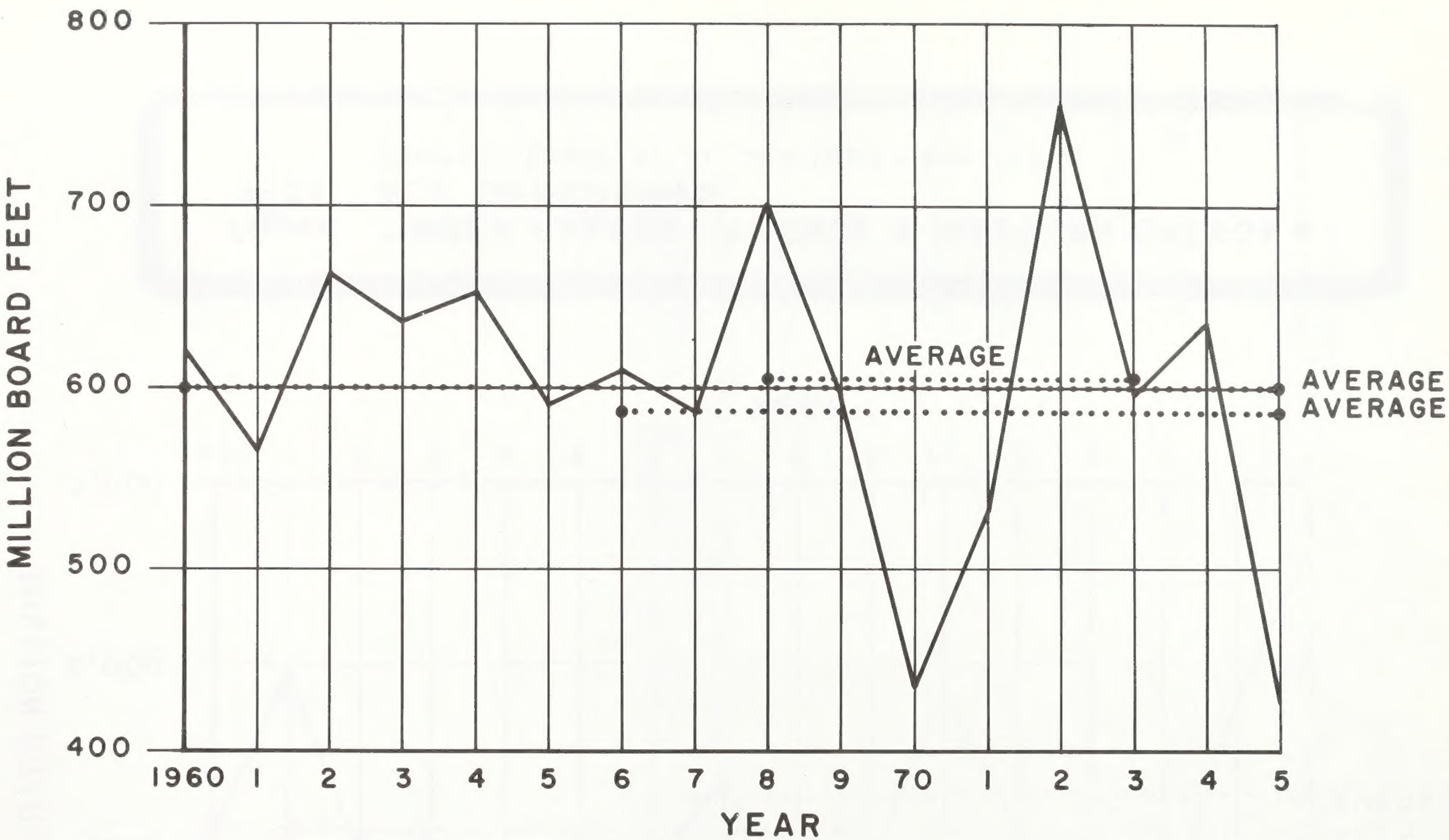


Figure 2-34 TIMBER HARVEST TRENDS • JACKSON & JOSEPHINE COUNTIES • ALL OWNERSHIPS
SOURCE: Lloyd., et. al., Jan. 1962 • Dec. 1976

Table 2-37

Land Ownership, Southwest Oregon Counties, Circa 1973-76[1]

	Coos	Curry	Douglas	Jackson	Josephine	Total
	Counties					
	Thousands of acres					
Federal	223	625	1,567	832	609	3,655
Public Lands	166	68	655	431	312	1,633
JSYU[2]	2	36	80	15	291	926
Outside JSYU	164	31	575	416	21	1,207
National Forest	56	557	912	401	296	2,222
State	65	12	49	5	8	138
JSYU	-	-	7	1	1	15
Local	22	2	29	9	32	94
JSYU	-	-	-	-	28	28
Private	732	404	1,612	959	391	4,099
JSYU	-	1	83	17	286	388
Total	1,041	1,042	3,257	1,805	1,040	8,186
JSYU	2	38	171	33	612	857

Source: 1 For county-wide estimates: Loy, William G., et.al., Atlas of Oregon, University of Oregon, Eugene, Oregon, 1976, pages 20 and 72.

2 For Josephine Sustained Yield Unit: BLM, Josephine Planning Area Analysis, Medford District Office, January 1977.

Table 2-38

Land Ownership, Southwest Oregon Counties,
(Percentage Distributions by Selected Categories) circa 1973-76*

	Counties					
	Coos	Curry	Douglas	Jackson	Josephine	(All Counties)
			Percentage			
Federal Gov't	21%	60%	48%	46%	58%	47%
Public Lands	16	7	20	24	30	20
JSYU	-	4	2	1	28	5
Outside JSYU	16	3	18	23	2	15
National Forest	5	53	28	22	28	27
State Gov't	6	1	1	-	1	2
JSYU			-	-	1	-
Local Gov't	2	-	1	1	3	1
JSYU			-	-	3	-
Private	70	39	50	53	38	50
JSYU	-	-	-	-	28	5
Total JSYU	_	4	5	2	59	10
	100%	100%	100%	100%	100%	100%

* Based on data from Table 2- 37

Percentages may not add to 100 due to rounding.

Table 2-39

Percentage by County of Each Selected Ownership Category in Southwest Oregon, circa 1973-75

Ownership Category

County	Government								Private		All Categories	
	Federal				State		Local					
		Public		National								
	Total %	Total %	JSYU %	Forest %	Total %	JSYU %	Total %	JSYU %	Total %	JSYU %	Total %	JSYU %
Coos	6	10	1	3	47	—	23	—	18	—	13	—
Curry	16	4	9	25	8	—	2	—	10	—	13	4
Douglas	41	40	19	41	35	47	31	22	39	22	40	20
Jackson	22	26	4	18	4	4	10	4	23	4	22	4
Josephine	16	19	68	3	6	49	34	74	10	74	13	72
	100 1/	100	100	100	100	100	100	100	100	100	100	100
CCDJJ 2/	47	(20)	(5)	(27)	2	—	1	5	50	5	100	10

Source: Derived from data displayed in Table 2-37.

1/ **Components may not add** to 100 due to rounding.

2/ Coos, Curry, Douglas, Jackson and Josephine Counties, percentage of total land area by ownership category.

Table 2-4 0

Destination of Logs Harvested from Public Lands in the Josephine SYU, 1973-75 Averages

Destination	Annual Average 1973-75 (MMbf)	Per Cent of Josephine MU Harvest 1973-95
Grants Pass	34	27%
Merlin	33	26%
Josephine Co.	67	53%
Glendale	46	37%
Roseburg	3	2%
Douglas Co.	49	39%
Medford	10	8%
Jackson Co.	10	8%
Total Processed	126	100%

Source: U.S.D.I., Josephine Planning Area Analysis, Medford D.O., BLM, 1977

Table 2-41

Destinations and Sources of Logs, All Ownerships, Received in Josephine and Douglas Counties, 1972

Destinations of Logs Harvested

Site of Harvest	Josephine Co. m.b.f.	Josephine Co. Per Cent	Douglas Co. m.b.f.	Douglas Co. Per Cent
Josephine County	113,141	60%	3,609	1%
Douglas County	32,699	17	1,062,550	70
Coos, Curry and Jackson County	41,911	22	213,935	14
Elsewhere	2,218	1	229,067	15
Total	189,969	100	1,509,161	100

Sources of Logs Processed

Destination	Josephine Co. m.b.f.	Josephine Co. Per Cent	Douglas Co. m.b.f.	Douglas Co. Per Cent
Josephine County	113,141	47%	32,699	3%
Douglas County	3,609	1	1,062,550	88
Coos, Curry, and Jackson Counties	92,987	38	101,054	8
Elsewhere	32,972	14	6,224	1
Total	242,709	100	1,202,527	100

Source: Derived from: Schuldt, J. P. and J. O. Howard, Oregon Forest Industries: Wood Consumption and Mill Characteristics, O.S.U. Extension Service and PNW Forest and Range Experiment Station, U.S.F.S., OSU Extension Service, Corvallis, Oregon, December, 1974.

Distribution of Commercial Timberland and Timber Harvest. Public lands account for 22 per cent of the commercial timberland in the area encompassed by Coos, Curry, Douglas, Jackson and Josephine Counties. Private lands account for 43 per cent of the acreage while 33 per cent is national forest land (Bassett, 1977).

Bassett (1977) indicates that during 1975, BLM-administered public lands in Josephine County accounted for 32 per cent of that county's commercial timberland, compared with 35 per cent for national forest, five per cent for "other" public, and 28 per cent for private lands. Comparing the above estimates with data from Table 2-38 and associated tables, it appears that national forest lands include higher proportions of commercial timberlands than do either private or BLM-administered public lands. Because of the inconsistency between percentages of land as compared to the percentage shares of commercial forest land, one may conclude that relative land area is not a totally reliable indicator of timber-related economic impact potential. Public lands in Josephine County contain 37 per cent and 52 per cent of that county's timber growing stock and sawtimber, respectively (Table 2-42).

Of all timber harvested in 1970-74 in Josephine County, public lands were the source of nearly 50 per cent. For the five southern Oregon counties, public lands contributed about 25 per cent of timber harvested during the same period (Table 2-43). Because logs are shipped across county lines, harvest data do not adequately portray dependence of the local economy. For example,

Table 2-43

Timber Harvest, Total, and Per Cent from Public Lands, Josephine County and Southwest Oregon* 1970-75 and Average

	Josephine Co.	(Public Lands)		Southwest Ore. Counties	(Public Lands)	
		--mmbf--(Per cent)			--mmbf--(Per cent)	
1970	121	46.5	38.4	2,654	625.6	23.6
1971	105	50.6	48.2	3,058	839.6	27.5
1972	194	113.7	58.5	3,058	811.6	24.9
1973	177	89.1	50.4	3,038	861.4	28.4
1974	145	70.6	48.6	2,692	580.5	21.6
1975	105	37.7	35.9	2,245	396.2	17.7
1976 1/		90.4				
6 Year Average	141	68.0	48.1%	2,824	685.8	24.3

Source: U.S.D.A., Timber Harvest by Ownership in the State of Oregon. (1970, 1971, 1972, 1973, and 1974). Forest Survey Project, Pacific Northwest Forest and Range Experiment Station, Forest Service, Portland, Oregon, (July, 1971, August 1972, September 1973, December 1974, January 1976, December 1976)

* Southwest Oregon includes Coos, Curry, Douglas, Jackson and Josephine Counties.

1/ Data for 1976 (Josephine co.) was provided by the Branch of Forestry, Oregon State Office, Bureau of Land Management

Table 2-4 2

Per Cent of Growing Stock and Sawtimber on Commercial Forest Land by County, Total and Public Lands, Southwest Oregon January 1, 1975

		County				
	S.W. Ore.[1/] Counties	Coos	Curry	Douglas	Jackson	Josephine
Growing Stock [2/]		- - - - - - - - - Percentage - - - - - - - - -				
(million cubic feet)	23,251					
All ownerships % of Region[3/]		14	11	49	17	10
Public Lands						
% of Region	26%	4	1	12	4	4
% of County	-	31	10	25	25	37
Sawtimber [4/]						
(MMBF) (Scribner)	104,995					
All Ownerships % of Region		17	11	51	15	7
Public Lands						
% of Region	29%	5	1	15	4	4
% of County	-	33	11	29	28	52

Source: Derived from: Bassett, Patricia M., Timber Resources of Southwest Oregon, USDA, Forest Service Resource Bulletin PNW -- 72, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon 1977 (Table 9)

1/ Coos, Curry, Douglas, Jackson and Josephine Counties.

2/ Includes trees 5.0 inches d.b.h. and larger.

3/ Percentages may not add to total due to rounding.

4/ Includes trees 11.0 inches d.b.h. and larger.

Josephine County mills processed 28 per cent more timber during 1972 than was harvested from Josephine County timberlands (Schuldt, 1974).

During 1968, timber harvested and timber processed in Josephine County were approximately equal; however, of the total processed, only 60 per cent was harvested from Josephine County forests (approximately 47 per cent of timber processed in Josephine County during 1972 originated in the county). Inferences regarding the local economic base dependent upon timber harvested must reflect differences in timber processed to timber harvest ratios due to intercounty log flows.

Location of Primary Log Destinations. Glendale is on the southern edge of Douglas County, adjoining Josephine County, 26 miles and 48 miles from the regional service centers of Grants Pass and Roseburg respectively. Glendale is near Interstate Highway 5, at a point 55 miles north of Medford, which is the nearest metropolitan service center (Loy, 1976, p. 100).

Regions to be Described

Due to the relationship of the JSYU boundaries to county areas, log destinations, location of commercial timberlands, and trade and service regions, the primary focus of the discussion of socio-economic factors will be on Josephine County. Secondarily, the Douglas County social and economic attributes likely to be related to the proposed action will be described. Coos, Curry, and Jackson Counties will be addressed minimally.

For all the following discussion of social and economic phenomena, geographic areas are selected, to the extent possible, based upon appropriateness to the probable social or economic consequences of public land uses within the JSYU. In all cases, Josephine County is recognized because it is the primary impact region and data are available covering the county, which is within the boundaries of the JSYU. Glendale, in Douglas County, is addressed since it is a major log destination. The Douglas County area is not as consistently referred to since aggregate social and economic variables of the county are affected only in minor ways by major events in Glendale.

In many cases, the Medford Timbershed (Jackson and Josephine Counties) is used since that is the area for which projections of timber yield are available. Because the JSYU impact area is not well approximated by any set of political or statistical areas, descriptions of locations of specific economic phenomena likely to be influenced by the JSYU are of necessity complex.

The absence of uniformly appropriate (to the JSYU) social and economic data necessitate fluctuation in geographic area discussed depending upon the subject or likely impacted locations.

Population Characteristics

The population of Josephine County in 1970 was 35,746, up from 29,919 in 1960. Estimated population in 1976 and 1977 was 47,000 and 50,900 respectively

(PSU, CPRC, January, 1977 and January 1978). The county population is projected to increase to 55,700 by 1980 and 71,600 by 2000.

Population density averages 22 persons per square mile, ranging from 1780 in and near Grants Pass to .3 in remote parts of the unit. Six per cent of the population lives on farms, 42 per cent is rural non-farm, and 52 per cent is urban. The major urban area is Grants Pass, the county seat, which had a 1972 population of 12,875, and a 1977 population of 14,000.

From 1960 to 1970, the population had a natural increase of 5.8 per cent (below the state average) and a increase due to net immigration of 13.7 per cent (above state average). A significant portion of immigration to Josephine County consists of retired persons. More than fifteen per cent of the population is 65 or older, compared with the State average of 10.8 per cent. Out-migration of persons is most apparent in the 20-34 age bracket.

There is little racial diversity in the county. In the 1970 census, Josephine County was 97 per cent Caucasian. The largest single ethnic minority consisted of 629 Spanish speaking people (1.76 per cent). There was a total of 235 Indians, 32 Orientals, 8 Negroes and 71 others.

Population Change

Population in Josephine County has been increasing at 4.7 per cent per year, a rate exceeding by a factor of 1.5 that for Oregon during 1970-76.

In 1960-70, population grew at an annual rate of 1.8 per cent, barely in excess of the 1.7 per cent rate for the State. Rural population remained constant, while urban population increased during the same period by 46 per cent. Population has been growing and inducing social and economic change at a rapid rate. Josephine County population has been increasing more rapidly than the United States, Oregon, or the southwest Oregon counties for every year since 1970 except 1974-75. Figure 2-35 and Table 2-44 display the data.

Residence Location

An overwhelming majority of the people in Josephine County live outside of city and town boundaries. Only 31 per cent of the residents live in towns and cities of 1,000 or more inhabitants. Yet, as will be shown below, the rural residents (69 per cent of the county population) are not, by and large, farmers, nor are they employed in the agricultural sector.

Education

According to Schmisseur and Boodt (1975, p.13), "In the four counties (Curry, Douglas, Josephine and Tillamook) males have significantly less education than the (Oregon) norm." Information provided (Ibid) indicates the median school completion level for females in

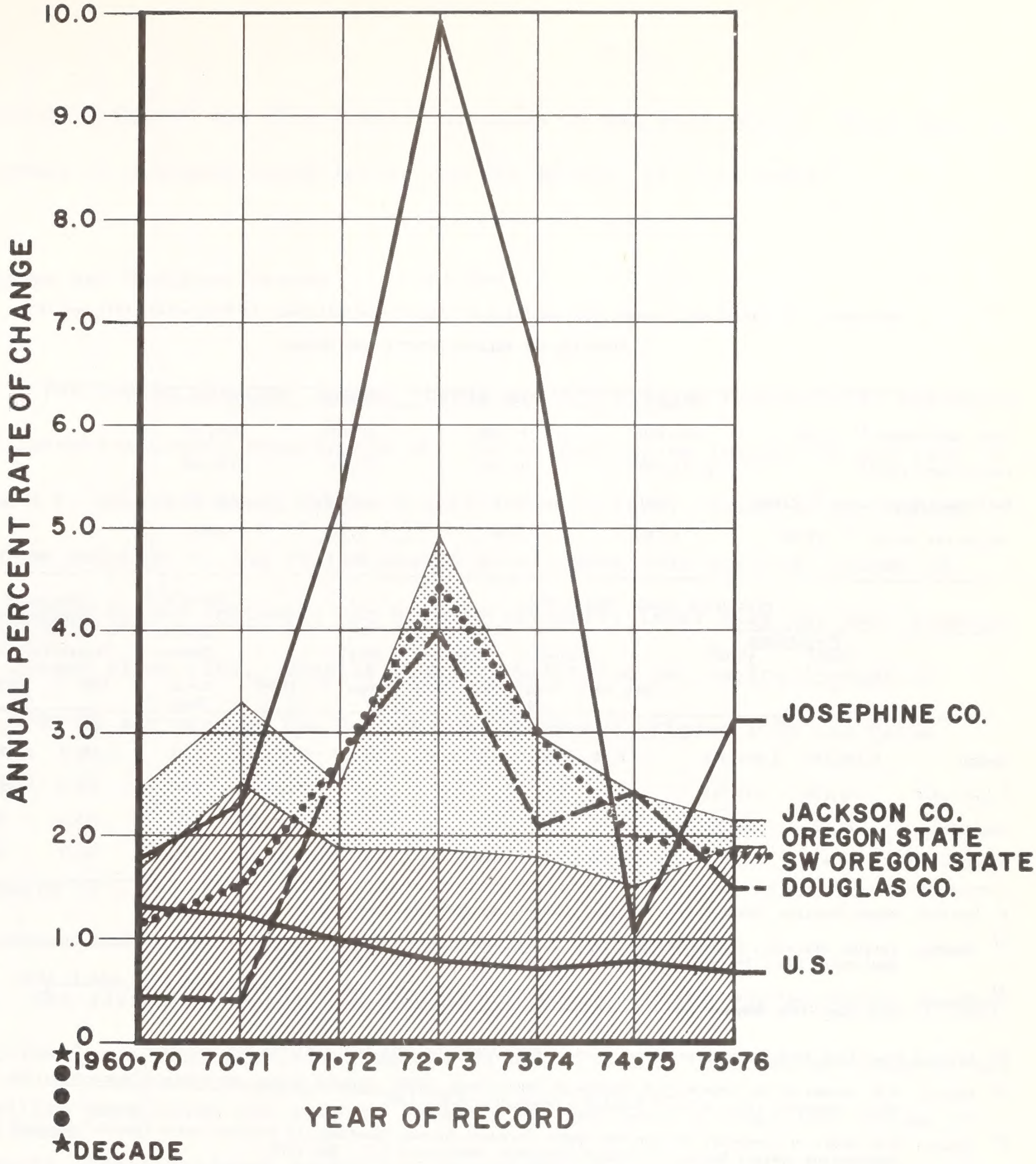


Figure 2-35 ANNUAL RATE OF POPULATION CHANGE
SOURCE: U.S. Data: U.S. Bureau of Census, Current Population Reports, series P•25 (various), 1960 PC(1)•39C, & 1970 PC(1)•C39
State & County Data: Portland State University, Population Research & Census Center, estimates 1971•1976

Table 2-44

Employment, Population and Income, 1974 and Ratio of Labor Force/Employment to Population, 1974 and 1970

JOSEPHINE SYU RELATED COUNTIES AND OREGON

	Oregon	Josephine	Douglas	C.C.D.J.J.*
Total Employment 1/ (1976)	968,000	16,400	32,400	120,380
Population (1976)2/	2,341,750	47,000	81,600	316,100
Employment/Population 3/ (1976)	0.41	0.35	0.40	0.38
Income per Capita 5/ (1975)	5,752	4,478	4,978	4,890

	Population Trends 1960 - 1970							1970-1976 2/		Population Projections 7/	
	Populations 1960 4/ #	Populations 1970 6/ #	Change Ann. Rate	Urban % Total (1970)	Urban % Change	Rural % Total (1970)	Rural % Change	1976 2/	1970-76 Change Annual Rate	Population Projections (1,000's) 1980	1990
Oregon	1,768,675	2,091,385	1.7%	67	+28	33	+3	2,341,750	1.9%	2,496.7	2,835.8
C.C.D.J.J.*	241,276	271,543	1.2%					316,100	2.6%	345.0	393.6
Josephine	29,917	35,746	1.8%	52	+46	48	-0	47,000	4.7%	55.7	66.3
Douglas	68,458	71,743	0.5%	34	+26	66	-4	81,600	2.2%	87.2	98.5

* Southern Oregon Counties, Coos, Curry, Douglas, Jackson and Josephine combined.

1/ Source: Oregon, State of, Oregon Resident Labor Force, Unemployment and Employment 1976 Dept. of Human Resources, Employment Div., Research & Statistics Section, Salem, Oregon, March 1977.

2/ Source: Portland State University, Population Estimates: Oregon Counties and Incorporated Cities, July 1, 1976. Center for Population Research and Census, P.O. Box 751, Portland, Oregon 97207.

3/ Derived from above data: Employment/Population. "Employment" in this case includes all employees.

4/ Source: U.S. Bureau of the Census, U.S. Census of Population: 1960. General Social and Economic Characteristics, Oregon. Final Report PC (1) - 39C., U.S.G.P.O., Washington D.C., 1961

5/ Source: U.S. Dept. of Commerce, "Oregon Per Capita Personal Income, Counties, in Selected Years 1966-74" Regional Economics Information System, Bureau of Economic Analysis, Washington D.C. May 1976.

6/ Sources: 1960 Data; U.S. Bureau of the Census, U.S. Census of Population: 1960. General Social and Economic Characteristics, Oregon. Final Report PC (1) - 39C., U.S.G.P.O., Washington D.C. 1961.

1970 Data; U.S. Bureau of the Census, U.S. Census of Population; 1970 Number of Inhabitants, Final Report PC (1) - A39, Oregon U.S.G.P.O. Washington D.C. 1971.

7/ Source: Portland State University, "State of Oregon Population Projections for Oregon and its Counties: 1975 - 2000" Population Bulletin CPRC Series P-2 #2, Portland, Oregon. February 1976.

Josephine County was 12.1 years; for males it was 11.7 years. These figures compare to a median State level, for all adults, of 12.3 years.

Income and Earnings Trends

Per capita personal income trends are depicted in Figure 2-36. Residents of Josephine County experienced the lowest per capita income (76 per cent of the U.S. average) among Oregon counties during 1974. Trend of per capita income relative to the United States illustrates that personal income of Josephine County residents has been persistently lower than for most counties of Oregon since 1966. Douglas County experienced per capita incomes of $4,978, 84 per cent of the United States average (Figure 2-36 and Table 2-44).

Poverty

The Josephine County 1970 median income was $6,861 for males and $2,689 for females. Mean family income was $8,484. Almost fourteen per cent of all families were below the poverty level. The per cent of families below the poverty level is almost double the State average of 8.6 per cent. Personal income and rate of growth of personal income are also less than the national and Oregon averages (Schmisseur & Boodt, 1975, p. 15).

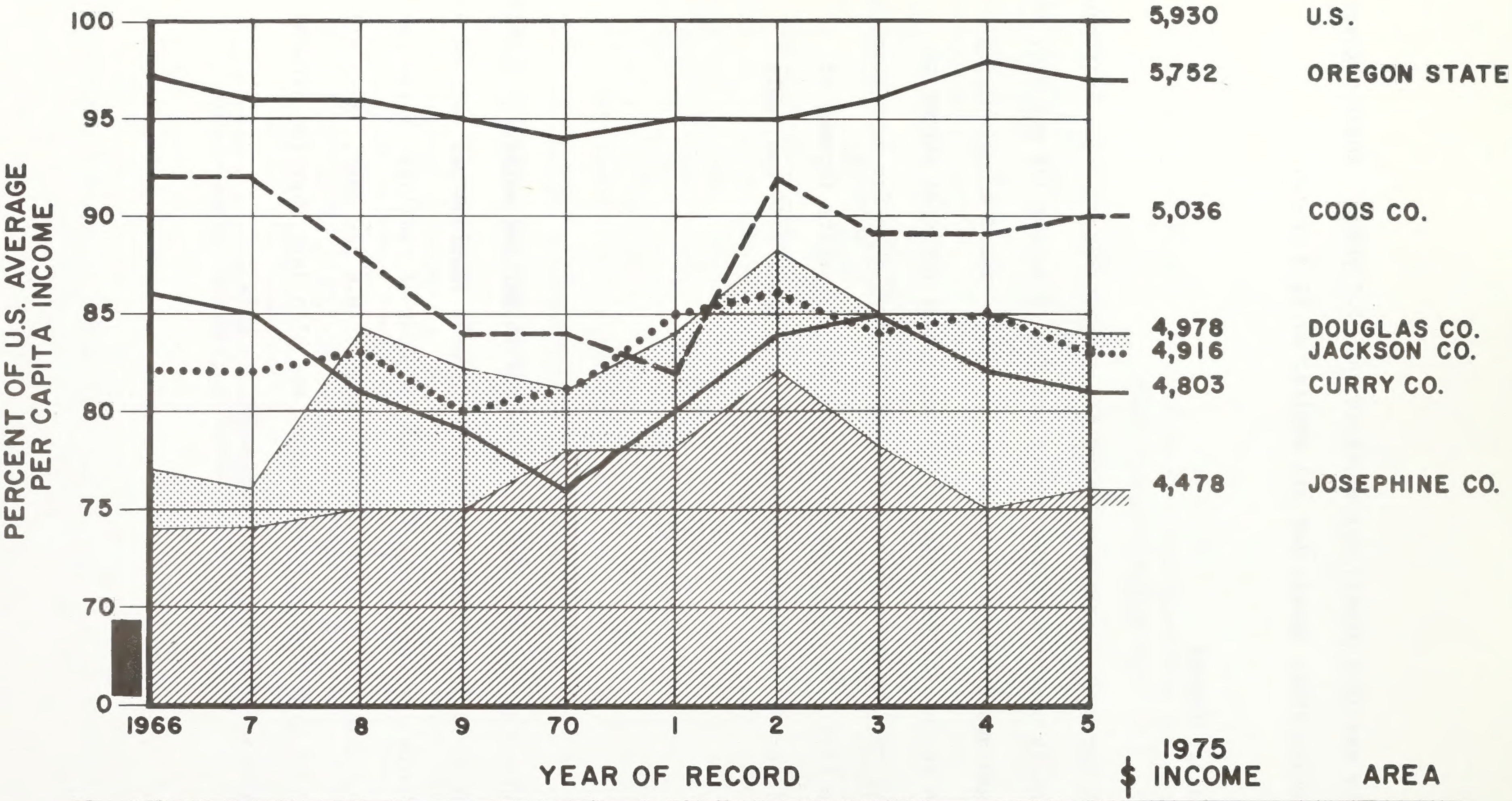


Figure 2-36 PER CAPITA PERSONAL INCOME/COMPARISONS & TRENDS RELATIVE TO U.S. LEVELS 1966•1975

SOURCE: U.S. Department of Commerce, Regional Economics Information System, Bureau of Economic Analysis, Washington, D.C., May 1977

Sources of Income

Personal income includes wages, salaries, property income and transfer payments (such as pensions, Social Security, and unemployment compensation). Most personal income is derived from wages and salaries.

The main single source of income for Josephine County in 1975 was transfer payments, which accounted for 25 per cent of that year's total. (The same percentage was nineteen per cent during 1970). For Oregon, the comparable proportion was fourteen per cent (eleven per cent during 1970). The total income from transfer payments has doubled since 1970 for both Josephine County and the State (see Appendix I). Reason for the relatively high level of transfer payments in Josephine County is undetermined.

The major single source of earned personal income is manufacturing (29 per cent during 1975). During 1970-74, the proportion of manufacturing accounted for by lumber, wood products and paper ranged in Josephine County from 0.75 to 0.83; in Douglas County, the ratio was stable at around 0.88 (U.S.D.C., R.E.I.S., January, 1977). Income from manufacturing in 1974 was about $1.5 million less than in 1973 (Appendix I). The relative significance of income from lumber and wood products manufacturing is only indirectly available by noting that in 1975, 79 per cent of all manufacturing employment involved lumber and wood products. The second major source of earned personal income is local, State and Federal government, third is wholesale and retail trade and fourth is services.

Timber Industry Sources

Direct earnings from lumber and wood products received as wages, salaries, dividends or profit by residents of Josephine County accounted for 12.7 per cent of personal income during 1975 (range was 12.7 per cent to 17.0 per cent during the 1970-75 period, Table 2-52). As a percentage of earnings, the same figure was 21 per cent (U.S.D.C., REIS, 1/77).

Local personal earnings dependent directly and indirectly on the forest products industry accounts for approximately 33 per cent of the total earnings and nineteen per cent of total income in Josephine County. The income generated by BLM timber sales and production represents about 36 per cent of that dependent on the timber products industry. Thus, personal earnings derived from BLM-administered timber in JSYU account for seven per cent of the Josephine County income.

Employment: Composition, Stability and Deficiencies

Composition

During 1970, logging and wood products manufacture accounted for 16.4 per cent and 26.3 per cent of total employment in Josephine and Douglas Counties respectively (8.3 per cent for Oregon), as shown in Table 2-45. Comparable data are unavailable for subsequent years; however, "covered" employment data for 1970 and 1975 indicate that the percentage of employment in lumber and

Table 2-45

Employment Composition by Sector
Oregon, andOJosephine and Douglas Counties, 1969

Economic Sector	Oregon	Josephine	Douglas
	% A	% (ratio) B (B/A)	% (ratio) C (C/A)
Agriculture & Food Processing	7.3	6.4 (0.9)	6.5 (0.9)
Mining	0.2	0.2 (1.0)	0.9 (5.1)
Construction	5.8	6.4 (1.1)	5.6 (1.0)
Logging and Wood Products Mfr.	8.3	16.4 (2.0)	26.3 (3.2)
Other Mfr.	11.3	7.6 (0.7)	6.4 (0.6)
Transportation	4.1	2.6 (0.6)	2.5 (0.6)
Utilities	3.1	2.5 (0.8)	2.2 (0.7)
Trade	18.3	18.2 (1.0)	14.8 (0.8)
Services	11.7	10.4 (0.9)	8.2 (0.7)
Tourist Related Trade & Services	7.8	9.1 (1.2)	7.0 (0.9)
Medical & Education & Other Prof.	17.3	15.3 (0.9)	15.5 (0.9)
Government	4.9	4.9 (1.0)	4.1 (0.8)

Source: Derived from U. S. Bureau of Census, 1972.

wood products in the county relative to the statewide average has remained constant for both counties. Because definitions of "covered employment" and "lumber and wood products" (Standard Industrial Classifications 24 and 26) changed between 1970 and 1975, it is impossible to provide directly comparable data on the percentage of total employment by individual categories. Ratios of county to State, calculated as in Table 2-46, for Josephine County were 2.2 for both 1970 and 1975; for Douglas County, the 1970 ratio was 3.6 and, in 1975, 3.5. It appears valid to generalize that the local economy has experienced only such shifts in employment composition as are consistent with the State pattern during the reference period (Oregon Covered Employment and Payrolls, 1970, 1974 and 1975)

For Josephine County, the per cent employment in lumber and wood products of all employment was nearly the same as it was in 1970 (Table 2-46). A longer-term view is provided by Table 2-47, which indicates a relatively stable level for total employment in comparison of 1950 to 1970. The lumber and wood products dominance appears to be post-World War II phenomena.

An additional and more comprehensive check on economic structure shifts is afforded for 1970-to-1974 comparisons by the Regional Economics Information System, U.S. Department of Commerce. Personal income originating from lumber and wood products (SIC 24), increased 51 per cent and 64 per cent (total wage and salary disbursements increased 60 per cent in each county) for Josephine and Douglas County respectively (U.S.D.C., July 29, 1977).

Table 2-4 6

Comparative Economic Structure as Indicated by Employment, 1975

	Josephine County		Oregon		United States
	Number	Percent	Number	Percent	Percent
Total employment*	15,515		930,000		
Agriculture	460		37,700		
Self-employed	3,330		112,100		
Total nonagricultural Wage and salary workers	11,840	100.0	830,800	100.0	100.0
Manufacturing	2,900	24.5	182,300	21.9	23.8
Lumber & Wood Prod.	1,890	16.0	67,000	8.1	0.7
Food Products	60	0.5	22,600	2.7	2.2
Other Manufacturing	950	8.0	92,700	11.2	20.9
Nonmanufacturing	8,940	75.5	648,500	78.1	76.2
Mining	0	0.0	1,500	0.2	1.0
Contract constr.	400	3.4	34,800	4.2	4.5
Transportation, communications, public utilities	520	4.4	49,500	6.0	5.8
Trade	2,770	23.4	196,500	23.7	22.0
Finance, insurance, and real estate	440	3.7	44,700	5.4	5.5
Service & misc.	1,730	14.6	145,000	17.5	18.2
Government	3,080	26.0	176,500	21.2	19.2

Sources: County and State data from State Employment Division
U.S. data from Employment and Earnings, DOL, Bureau of Labor Statistics, January, 1976.

* Components do not add to total because "total employment" is on a "place of residence" basis, whereas "non-agricultural" employment is reported on the basis of location of the establishment.

Table 2-47

Employment by Economic Sector, Josephine County, 1940 to 1970

Industry	Employment in 1940	1950	1960	1970
Agriculture, forestry, & fisheries...	1,686	1,700	974	598
Mining................................	473	113	44	20
Contract construction.................	264	592	671	695
Manufacturing.........................	533	2,623	2,708	2,693
Food & kindred products............	86	97	101	93
Textile & apparel products.........	2	6	4	50
Lumber. wood products, furniture...	358	2,381	2,323	1,776
Printing & publishing..............	49	76	120	135
Chemical & allied products.........	4	2	0	4
Electrical & other machinery.......	5	18	61	99
Transportation equipment...........	4	5	38	317
Other & miscellaneous manufacturing	25	38	61	219
Railroads & rail express.............	51	73	52	50
Trucking & warehousing...............	50	87	155	130
Other transporation..................	19	42	69	102
Communications.......................	25	55	83	149
Utilities & sanitary service.........	52	174	166	118
Wholesale trade......................	65	233	228	310
Food & dairy product stores..........	143	260	308	317
Eating & drinking places.............	157	318	371	436
Other retail trade...................	458	897	955	1,350
Finance, insurance, real estate......	89	217	328	433
Hotels & other personal services......	263	361	414	433
Private households....................	165	200	307	119
Business & rapair services............	148	320	264	320
Entertainment, recreation services....	39	69	51	118
Medical, other professional services..	356	673	1,041	1,922
Public administration.................	148	233	274	536
TOTAL......................	5,184	9,240	9,463	10,849
Unemployment..............	a/	631	1,096	1,169

a/ Not available.

SOURCE: U.S. Department of Commerce, Census of Population.

The proportion of wages, salaries and proprietorship earnings from wood products industries relative to total personal income has declined moderately in 1974 and 1975 based upon comparisons for 1970 and 1975 (the most recent data). For Josephine County, the proportion was 14.9 per cent for 1970 and 12.7 per cent during 1975, for Douglas County the proportions were 30.0 per cent and 27.1 per cent for 1970 and 1975 respectively. Oregon displayed similar stability of total timber-based earnings to total personal income of 9.1 per cent and 8.0 per cent for 1970 and 1975 respectively. During the intervening years there was a temporary increase in the percentage of total income originating from wood products industries (Table 2-48).

Stability

Community leaders may be concerned about the extent of year-to-year and seasonal (within year) variability of employment. Data related to employment stability are displayed in Tables 2-49 and 2-50. Table 2-36 indicates that seasonal variation in lumber and wood products employment has increased from a coefficient of variation of ten per cent in 1970 to seventeen per cent in 1975 for Josephine County. This fact has more meaning, perhaps, when viewed in comparison with the coefficient of variation for all sectors of eight per cent in 1970 and nine per cent in 1975. The coefficient of variation of average annual employment for lumber and wood products sectors from year-to-year was eleven per cent for Josephine County for 1970-76. The maximum deviation from average for any year-to-year comparison during the period was fourteen per cent.

Table 2-48

Earnings by Timber Industry Source, as a Percent of Total Personal Income of Residents, Josephine Co., Douglas Co., and Oregon 1970-1975

	Lumber & Wood Prod.	Paper & Allied Products	Total Wood
Josephine Co.	%	%	%
Year		a/	
1970	14.9	w	w
1971	15.7	w	w
1972	17.0	w	w
1973	16.0	w	w
1974	13.3	w	w
1975	12.7	w	w
Douglas Co.			
Year			
1970	30.0	w	w
1971	32.1	w	w
1972	33.0	w	w
1973	32.3	w	w
1974	30.0	w	w
1975	27.1	w	w
Oregon			
Year			
1970	7.8	1.3	9.1
1971	8.1	1.2	9.4
1972	8.6	1.2	9.8
1973	8.4	1.1	9.6
1974	7.5	1.2	8.7
1975	6.9	1.2	8.0

Source: Derived from U.S.D.C., Regional Economics Information System (Special request July 29, 1977), Table 8.03.

a/ w - Indicates that data are withheld to avoid possible disclosure of confidential information regarding a single firm.

Table 2- 49

Unemployment Rates, Employment in Lumber & Wood
Products for Josephine Co., Douglas Co. and Oregon, 1970 - 1976

	Josephine		Douglas		Oregon	
	Unemployment Rate	Employment in Lumber & Wood Products a/	Unemployment Rate	Employment in Lumber & Wood Products a/	Unemployment Rate	Employment in Lumber & Wood Products a/
1970	10.3	1,840	9.0	7,495	7.1	66,766
1971	10.2	2,090	8.4	8,320	7.6	70,400
1972	9.0	2,360	7.2	8,970	6.8	75,415
1973	9.1	2,360	7.4	9,150	6.2	79,100
1974	12.2	2,140	9.4	8,980	7.5	75,000
1975	15.7	1,890	12.7	8,280	10.6	67,800
1976	13.6	2,450	10.3	8,870	9.5	73,800

a/ These data do not include mobile home manufacturing, which was included in regular Employment Divison reports for years 1975 and 1976.

Source: Telephone report 5/13/77 from Mr. Lynch, Research & Statistics Section, Employment Division, Department of Human Resources, State of Oregon

Table 2-50

Major Employers in the Grants Pass, Roseburg and Medford Area, with Approximate Employment and Major Product, 1974

AREA	NAME OF FIRM	EMPLOYEES[a/]	PRINCIPAL PRODUCT
Grants Pass	Southern Oregon Plywood	180	Plywood
	Bate Plywood Co., Inc.	220	Plywood
	The Robert Dollar Company	180	Plywood & Lumber
	Glendale Plywood	150	Plywood
	SWF Plywood Company	200	Plywood
	Sierra Wood Products	50	Plywood
	Agnew Plywood	200	Plywood
	Carolina Pacific Plywood	200	Plywood
	Tim Ply Company	150	Plywood
	SH&W Lumber Company	130	Lumber
	Spalding & Son, Inc.	150	Lumber
	Diamond Industries	125	Pre-fab Cabinets
	Champion Products	85	Athletic Knitwear
Roseburg	Roseburg Lumber Company	4,000	Wood Products
	UARCO, INC.	135	Business Forms
	Douglas County Lumber Co.	350	Wood Products
	Keller Lumber Co.	75	Wood Products
	U. S. Plywood	250	Wood Products
Medford	Boise Cascade Corporation	470	Veneer & Plywood
	Bear Creek Corporation	600	Gift & Canned fruits
	Medford Corporation	600	Sawmill - veneer and plywood
	3M Company	250	Packaging materials
	Cascade Wood Products	350	Millwork
	Standard Transformer	95	Transformers
	Superior Plastics	100	Boat building
	Reichhold Chemicals, Inc.	26	Industrial chemicals
	Medford Steel	95	Sheet metal
	Kadee Metal Products	10	Special tools & dies
	Northwest Printed Circuits	30	Electronic components

* Source: Oregon, State of, An Oregon Community Profile (individual sheets for Grants Pass, Roseburg and Medford), Dept. of Economic Development, 1975.

a/ Employment figures are approximate because Employment Division information regarding three firms or fewer is confidential.

Employment in lumber and wood products exhibited greater seasonal stability in Douglas County than in Josephine County, as was the case for total employment for the years analyzed (1970, 1974 and 1975) (Table 2-49). The coefficient of variation on year-to-year employment averages was seven per cent for the 1970-76 period, which was approximately the same as the seasonal variability measure. Whether the timber industry in the JSYU is a stabilizing or destabilizing factor cannot be concluded in general. It appears that for Josephine County, the timber industry contributes instability, whereas for Douglas County, stability is improved by timber industry employment.

Table 2-43 shows year-to-year shifts in the amount of timber harvested from previous BLM sales in Josephine County ranging as high as 63 MM b.f. from 1971 to 1972 and 53 MM b.f. from 1975 to 1976. The most severe long-term decline over several years was 76 MM b.f. from 1972 to 1975. These variations illustrate the sharp swings in harvest level that result from fluctuations in the timber products market. These extreme cyclical shifts far exceed the decrease expected to result from the proposed action.

Major Employers

In Josephine County during 1974, the largest private employers (in the 180 to 220 employee category) were six plywood mills. For Douglas and Jackson Counties the picture was distinctly different. Jackson County was more diversified, however, there were two plywood firms that cumulatively employed 1,070 employees, which is about as many employees as are employed by the six

largest firms in Josephine County. Although Douglas County businesses are also primarily in lumber and wood products, one firm employed 4,000 employees. This displays for Douglas County much less diversity in ownership and industrial structure than either Jackson or Josephine County (Table 2-50). For Glendale, the reported (Directory of the Forest Products Industry, 1976) timber processing capacity in 1974 was about 122 MMbf (Table 2-51).

Unemployment

Since 1969, the unemployment rate in Josephine County has, on the average, exceeded the statewide rate by 3.5 points. During recent years Josephine County has frequently experienced the highest unemployment rate among all Oregon counties (13.6 per cent during 1976). In 1975, of the 18,311 in the Josephine County labor force (Lynch, 1977), only 15,515 persons were employed. Unemployment rates during 1975 were significantly high, averaging 15.7 per cent for the year and fluctuating from a high of more than 21 per cent during the first quarter of 1975 to a low of about twelve per cent in the third quarter of the year. Average employee earnings in 1975 amounted to $8,429 (Kohl, 1976). The Douglas County unemployment rate exceeded the Oregon rate, on the average by 1.3 points for 1970-76.

Table 2-51

Production and Capacity of Glendale Area Mills

	Production 1974	Annual Capacity 1/
Robert Dollar Co.		
Sawmill	48 MMbf	64 MMbf
Softwood Veneer	48 MMbf 2/ 3/	64 MMbf
Superior Lumber Co.		
Sawmill	26 MMbf	48 MMbf

1/ Assuming 365 day/year operation
2/ Converted from 1/8" surface square feet to scribner log scale
3/ Based upon "capacity" in the absence of production information.

Source: Directory of the Forest Products Industry, 1976.

Income and Employment Effects of Logging and Processing

Personal Income

Lumber and wood products accounted for 12.7 to 17 per cent of direct income received by Josephine County residents in 1970-75. In Douglas County, the figure ranged from 27.1 to 33 per cent. For the State as a whole, the percentage of direct wage, salary and proprietorship income from lumber and wood products (SIC 24) ranged from a low of 6.9 to a high of 8.6 during the same period (See Table 2-48).

Because lumber and wood products form a major part of the export base for Josephine and Douglas Counties, the direct income generated is only part of the local income dependent on timber harvest and processing. Douglas County export based income was estimated to be 68.7 per cent dependent upon exports by the forest-oriented sectors (including BLM and USFS) during 1970 (Darr, 1974, page 14). An alternative estimating procedure indicated that 42 per cent of Douglas County personal income during 1970 was dependent on lumber and wood products. The alternative is based on SIC 24, which is not as broadly defined (i.e., does not treat BLM and FS activities as export base sectors) as the 68.7 per cent estimate (U.S.D.I., S.E.P.21, 1973 page 42). Based on the latter procedure, 24 per cent of Josephine County's direct personal earnings were generated within the lumber and wood products sector (U.S.D.I., S.E.P.21 p. 43).

Employment Related to Harvest and Processing

The most recent data available indicates that the employment requirements per unit timber logged or processed by sawmills or veneer and plywood mills are not dramatically different between Josephine County and southwest Oregon counties or western Oregon (Table 2-52). Douglas County, however, appears to have experienced uniformly lower labor input per unit processed. Based on data from Appendix H a composite employment impact per million board feet locally processed was 7.35 during 1968-73 and is projected to be 6.55 during the 1975-85 period.

Income Related to Employment

The Douglas County interindustry model (Youmans, et al., 1973) was used in the Josephine SYU Planning Area Analysis to estimate parameters relating quantities of locally harvested and processed timber to "direct and indirect" (referred to hereinafter as "total") personal income. Subsequently received information (U.S.D.C., R.E.I.S. 7/77) made it possible to compare the previously derived estimates. With the Douglas County model, the estimate of "direct and indirect" timber-dependent personal income was barely in excess of the "direct" income estimated by the above source.

Josephine County processes more timber than is harvested within the county, whereas the opposite is true for Douglas County. This asymmetry makes it impractical to utilize the analysis of the Douglas County economy directly

Table 2-52

Employment - Timber Processed Relationships for Southern Oregon Counties, 1972*

Forest Products Employment by County in 1972

Resource area and counties	Logging SIC 2411	Sawmills SIC 2421	Veneer and plywood SIC 2432	All other SIC 24	Lumber and wood products SIC 24	Paper and allied products SIC 26
	Number of employees					
Southwest						
Coos	1,129	1,870	2,023	220	5,242	170
Curry	271	207	952	64	1,434	0
Douglas	1,885	2,188	3,915	998	8,986	1/ 335
Jackson	748	1,174	2/	1,174	2/	180
Josephine	348	701	2/3,722	97	2/7,962	1/
Total	4,379	6,140	10,612	2,553	23,684	685
Western Oregon	10,570	17,422	25,414	8,569	61,975	6,234

Employment-Wood Consumption Relationships, 1972

Resource area and Counties	Logging SIC 2411	Sawmill and Planing mills SIC 2421	Veneer and Plywood SIC 2432
	Employees per million board feet		
	(Harvested)	(Processed)	(Processed)
Southwest			
Coos	1.757	4.301	6.803
Curry	0.965	2.176	8.832
Douglas	1.194	3.457	6.923
Jackson	1.334	4.165	3/
Josephine	1.780	3.859	3/7.531
Total	1.344	2.776	7.245
Western Oregon	1.413	3.843	7.849

1/ Douglas and Josephine have been combined to avoid disclosure.
2/ Jackson and Josephine have been combined to avoid disclosure.
3/ Jackson and Josephine have been combined to avoid disclosure.

Source: Wall, Brian, Employment/Wood Consumption Relatinships, 1972, an unpublished report, PNW, Forest and Range Experiment Station, U.S.D.A., Portland, Oregon, July 1977.

in developing estimates for Josephine. In the absence of this comprehensive tool, ratios of direct income to quantity of stumpage processed during 1972 were adjusted to 1974 and utilized. The most recent data on quantity processed by county are for 1972 (Schuldt 12/74, Table 4). Timber harvest by ownership for 1974 and 1975 is presented in Table 2-53. The estimates are updated to 1974 to provide comparability with other analyses in the Josephine SYU, P.A.A. An additional warning is in order regarding attempts to reliably understand timber harvest impact upon the dependent economy. Some activities included in S.I.C. 24, "Lumber & Wood Products", are resource-dependent, i.e., directly influenced by the level of timber harvest: for example, logging camps and logging contractors, sawmills and veneer and plywood mills. Others such as wood kitchen cabinet manufacture, millwork, and wood moldings and mobile home manufacture, once established, will respond in level of output to demand factors almost exclusively, as contrasted with timber harvest, or supply forces. The data available include both types of activities and therefore overstate the likely income impacts of changes in level of timber harvest.

Income/Quantity Processed

During 1972, direct personal income per mbf was \$93, \$102 and \$83 in the Oregon Fir Region (excluding Hood River County), Josephine County and Douglas County respectively, as derived from Schuldt (December, 1974, Table 4) and U.S.D.C., R.E.I.S., February, 1977. Based on income multipliers from (U.S.D.I., S.E.D., 1973) of 1.538 (Josephine) and 1.414 (Douglas), the total income per thousand board feet processed would be \$160 for Josephine County

Table 2-53

Timber Harvest by Ownership,
Josephine County and Douglas County, 1974 and 1975

Land Ownership	Josephine Co. MBF	Josephine Co. Percent	Douglas Co. MBF	Douglas Co. Percent
1974				
Private	12,972	8.9	648,328	48.8
State	2,710	1.9	29,013	2.2
BLM	70,566	48.6	287,569	21.6
USFS	55,880	38.5	364,134	27.4
Other Public	3,071	2.1	446	-
TOTAL	145,199		1,329,490	100.0
1975				
Private	10,492	10.0	663,936	57.1
State	1,269	1.2	13,281	1.1
BLM	37,682	35.8	178,311	15.3
USFS	51,474	49.0	304,125	26.2
Other Public	4,165	4.0	2,587	0.2
TOTAL	105,082		1,162,240	

Source: USDA Forest Service, 1974 (1975 Oregon Timber Harvest, Resource Bulletin PNW-63(69), January 1976 (December 1976)

and $120 for Douglas County. Updated to 1974, using harvest/process ratios existing in 1972, the direct personal income per thousand board feet processed in 1974 was $135 in Josephine and $114 for Douglas Counties. The total (direct plus indirect) personal income per thousand board feet processed is estimated at $207 for Josephine and $161 for Douglas County. These ratios overestimate the income effect of changes in harvest due to inclusion of wood products manufacture directly dependent on local timber harvest.

Table 2-49 shows the relationship between total volume harvested and total volume processed by the lumber and wood products industry in Josephine County. It also shows the percentage of the volumes which originated on BLM-administered lands.

Table 2-54 shows the direct and indirect personal income and employment attributed to logging and processing of timber from BLM-administered lands in the Josephine SYU. For Josephine County it was estimated to be $13.8 million, and for all destinations $23.5 million.

Public Revenues

The formula for distribution of O&C receipts is based on the total of receipts of timber sales from all O&C lands in western Oregon. During fiscal year 1976, ten per cent of funds distributed to counties from the O&C receipts were derived from O&C lands under USFS management (BLM, Public Land Statistics, 1973, 1974, 1975 and 1976 FY, Table 116). Receipts of each county government

Table 2-54

Relationship of JSYU Timber Harvest Under Current Management to Selected Economic Variables in Destination Counties, 1973 to 1975 and Projected to 1980

	Units	Average Annual 1973-4-5	Projected 1980
Timber Supply			
Annual Harvest (JSYU)	(MMbf)	126	146
Direct Employment 1/	(Jobs)		
Merlin	"	239	258
Grants Pass	"	230	249
Josephine Co.	"	469	507
Glendale	"	327	354
Roseburg	"	18	19
Douglas Co.	"	345	373
Medford	"	71	77
Jackson Co.	"	71	77
Total Local	"	885	957
Non-Local 2/	"	101	93
Total Employment 3/			
Josephine Co.	"	721	780
Douglas Co.	"	488	528
Jackson Co.	"	112	121
Total Local	"	1,321	1,429
Non-Local	"	149	138
Dependent Population (persons) 4/			
Josephine Co.	"	2,100	2,200
Douglas Co.	"	1,400	1,500
Jackson Co.		300	350
Total Local		3,800	4,080
Non-Local		430	400
Total Personal Income (1974) 5/			
Josephine Co.	($1,000,000)	13.8	n.e. 6/
Douglas Co.	"	7.9	n.e.
Jackson Co.	"	1.8	n.e.
Non-Local	"	n.e.	n.e.
Public Finance (O&C Payments-JSYU)			
JSYU Dependent O&C Payments	($1,000,000) 7/		
O&C Counties	"	4.85	12.2
S.W. Oregon	"	3.02	7.6
Josephine Co.	"	0.59	1.5
Douglas Co.	"	1.22	3.1
Jackson Co,	"	0.76	1.9
Tax Rate Equivalence 8/	$/$1,000		
O&C County Area	"	0.20	0.34
S.W. Oregon	"	0.78	1.39
Josephine Area	"	1.25	2.10
Douglas Area	"	0.90	1.66
Jackson Area	"	0.65	1.12

1/ Includes employment in logging, sawmills and veneer & plywood mills.
2/ Non-local employment is based on processing of coarse wood residue from local mills resulting from processing of timber from the JSYU. Processing locations are outside the Jackson-Josephine County area.
3/ Based on secondary employment in activities supporting logging & primary processing.
4/ Population is estimated based upon the aggregate employment/population ratio: 0.35.
5/ For basis, refer to narrative presented in this section.
6/ The letters (n.e.) represent data that was not estimated because of inadequate basis.
7/ O&C payments to counties are based upon estimated stumpage prices of $77/Mbf for Medford District timber harvested in 1973-4-5 and projected price of $167/Mbf for timber harvested during 1979-80-81. Average price for timber sold in Western Oregon during FY 1977 was $171/Mbf.
8/ For an explanation of tax rate equivalence, see the following Table 2-56.

are based on fixed proportions of the O&C counties' fund. For southwest Oregon counties the percentage shares in the distribution (USDI, 1964) are: Coos, 5.9%; Curry, 3.65%; Douglas, 25.05%; Jackson, 15.67%; and Josephine, 12.08%. Individual county receipts, therefore, vary with timber receipts for all O&C lands rather than with timber harvest (or stumpage prices) within the individual county. Public lands in the JSYU account for approximately seven per cent of total O&C receipts.

For all O&C counties combined, the O&C disbursements to counties were equivalent to a levy based on all taxable property at a rate of $3.01 during 1977. The comparable tax rate statistic representative of the southwest Oregon counties as a group was $7.63 during 1976, and $12.07 during 1977. For individual southwest Oregon counties the same equivalency, during 1976 and 1977, was: Coos, $4.14 and $6.59; Curry, $8.41 and $13.27; Douglas, $9.04 and $14.47; Jackson, $6.18 and $9.78; and for Josephine, $12.00 and $18.23. Table 2-55 contains details on "tax rate equivalence" and "per cent supplement to levy" for each O&C county for 1976 and 1977. The "per cent supplement to levy" was calculated by dividing the O&C payment by the appropriate property tax levy. For the Josephine and Curry county areas, such payments in 1977 exceeded the combined tax levy. From 1976 to 1977 the proportion of the two sources of revenue combined accounted for by O&C payments nearly doubled. The average tax rate equivalency of O&C payments for the years 1973-74-75 was moderately higher than during 1976 for most counties.

Table 2-5 5

O&C Revenue Disbursements Expressed as Property Tax Rate Equivalence and Per Cent Supplement to Property Tax Levy, O&C Counties, 1976 and 1977

	Tax Rate Equivalence 1/			
	Dollars per $1,000 Assesed Value		Percent Supplement to Levy	
	1976	1977	1976	1977
Benton	$2.31	$3.36	9.1%	21.9%
Clackamas	1.07	1.69	4.0	6.8
Columbia	1.38	2.20	8.9	15.2
Coos	4.14	6.59	16.0	30.9
Curry	8.41	13.27	44.8	120.2
Douglas	9.04	14.47	57.6	90.0
Jackson	6.18	9.78	28.2	50.5
Josephine	12.01	18.23	60.6	119.1
SW Oregon	7.63	12.07	38.0	68.4
Klamath	1.56	2.47	10.5	17.3
Lane	2.53	3.92	10.2	17.1
Lincoln	0.31	0.45	1.8	3.4
Linn	1.13	1.77	5.2	9.4
Marion	0.41	0.62	1.5	2.6
Multnomah	0.08	0.13	0.3	0.5
Polk	2.55	3.91	9.9	16.2
Tillamook	0.94	1.38	5.0	8.2
Washington	0.12	0.19	0.5	0.8
Yamhill	0.69	1.09	2.8	4.9
All O&C Counties	$2.16	$3.01	7.9	13.6

1/ Calculated as follows: O&C payment tax rate equivalency = O&C payment divided by Total true cash value of property (thousands of dollars) ---Total true cash value estimates are from: Oregon, State of, Summary of 1977 Assessment Rolls, Department of Revenue, Salem, Oregon, November 10, 1977 and from: Oregon, State of, Oregon Property tax statistics 1976, Dept. of Revenue, Salem, Oregon, 1977

2/ Calculated as follows: Percent supplement to levy = O&C payment divided by levy of all taxing units within and including the county. Levy estimates are based on Oregon, State of, Telephone inquiry of Mr. Dick Yates, Dept. of Revenue, November 4, 1977 (for 77/78 levy), and the second reference in footnote 1 for the 76/77 levy.

Note: O&C payment for FY 1976 are based on receipts from 7/1/75 to 6/30/76: for FY 1977 the payments are based on receipts from 10/176 to 9/30/77.

During 1977, the O&C receipts were equivalent to 13.6 per cent of tax base for the combined O&C counties, and 60.4 per cent for the combined southwest Oregon counties (31 per cent for Coos, 120 per cent for Curry, 90 per cent for Douglas, 51 per cent for Jackson, and 119 per cent for Josephine).

The O&C payments to counties increased by 80 per cent from 1976 to 1977; however assessments of taxable property increased by 27 per cent during the same period, and combined tax levies increased by sixteen per cent for all O&C counties.

In a number of counties O&C receipts are a highly visible source of county government revenue. In Josephine County, such receipts make property taxes unneccessary for support of county administration. Schools, municipal and other local government functions, however, do levy a property tax. Table 2-56 displays sources and uses of county revenue by broad classes for Douglas and Josephine county government functions.

The datum in Table 2-56 does not adequately represent all interested parties. Other local government units within each county will find passage of tax issues more or less difficult depending upon the rate required for the proposed combined tax. Where counties receive a significant portion of their revenues from the O&C fund, it is possible to maintain a given level of services with a lower levy. In addition, where county government budgets are relatively rich in non-tax sources of revenue, services and improvements

Table 2-5 6

Summary of Josephine and Douglas County Revenues
and Expenditures for Fiscal Year 1975-76

Item	Josephine Co.1/ Amount	Josephine Co.1/ Percent	Douglas Co.2/ Amount	Douglas Co.2/ Percent
Revenues				
O&C Payments3/	$5,961,234	56.1%	$12,361,664	47.6%
County Property Taxes	--------	0.0%	1,352,742	5.0%
All Other Revenues	4,666,250	43.9%	12,329,771 4/	47.4%
Total Revenues	$10,627,483	100.0%	$26,044,177	100.0%
Expenditures				
General Fund	6,468,800	61.3%	10,727,261	36.0%
Road Fund	2,386,096	22.6%	8,383,224	28.0%
Other Funds	1,698,020	16.6%	10,679,327	36.0%
Total Expenditures	10,552,916	100.0%	29,789,812	100.0%

1/ Source: Office of the Josephine County Commission
2/ Source: Douglas County Budget Director
3/ Based on 1975 FY O&C payments, included in county revenues during FY 1976
4/ Does not include carry-over surplus of 13,691,358.

normally provided by town, city, schools, or special districts become county-supported functions. (The Douglas County government provided $2,000,000 for support of schools during 1976 and has committed to the same level during 1978.)

Social Values and Attitudes

Impact Population

The focus of concern in this section is on those persons in the Josephine Sustained Yield Unit who would comprise the "impact population" if the proposed action were taken. The attitudes and values of tourists, travelers and non-local environmental organizations will not be discussed.

The impact population is composed heavily of rural, non-farm residents. Unemployment is very high, annual earnings are significantly low, and school completion levels are below the State median.

The divorce rate exceeds the average for the State (7.4 per 1,000, compared with 6.8). Funds for public assistance (supplementary security income, old age assistance, general assistance, and food stamp programs) exceed statewide average expenditures (Kohl, 1976). There is a higher proportion of persons age 65 and older in the county (15%) than there is in the State as a whole (11%), however, the proportion of such persons with incomes below the poverty level is approximately the same (24 %).

The impact population demographic characteristics are: rural, low income, high unemployment, a relatively strong dependence on welfare assistance, and a high proportion of aged persons.

County residents hold diverse opinions on not only present socioeconomic conditions but also future plans. Attitudes range from supporting a "no change - no growth" position to emphasizing an "aggressive plan" to attract new industries and businesses (Lowenberg, 1975, p. 61-85).

In a certain sense, such a discrepancy in attitudes, even in an economically depressed area, is not surprising. Those who earn incomes higher than average, and who can and/or do appreciate living in a region with a low population density, can argue easily for no change or no growth. On the other hand, those who want to work but cannot find jobs and those whose assets would be increased could be expected to support efforts to maintain existing or attract increased employment.

A broad range of opinions was voiced at public meetings in the JSYU. Some favored increased cutting, others supported an immediate cessation of cutting. Some supported a continuation of present practices, others wanted thorough revisions. The increased cut viewpoint was held by people of entirely different age and employment backgrounds. Some were motivated to this viewpoint by concern over the increase of taxes, others wanted to speed the end of timber industry domination in order to stabilize the economy (compare Lowenberg, 1975, p. 37).

Employees of the Lumber & Wood Products Industry

A description of the statewide labor force probably applies to the labor force in the timbershed of the JSYU. Descriptive results from the study by Stevens (April 1976) present their situation as follows.

> "In marked contrast to the Census report that there are about 68,000 wood products workers in Oregon, the state-wide study finds that there are actually about 110,000 workers. This results from taking a more comprehensive view of a wood product worker, --that is, anyone who received wages during the 1972 calendar year.
>
> "Average monthly employment in wood products in 1972 was about 75,200 jobs; thus, there are about three workers for every two jobs. These jobs are shared, rather unequally, between a core labor force of about 60,000 to 65,000 non-mobile workers and a peripheral labor force of about 40,000 to 45,000 mobile workers.
>
> "The core labor force (60,000 to 65,000 workers) is relatively homogeneous and easy to describe. In general, these workers are white male, in their early forties, have an eleventh grade education, are married, and live in small towns. They have worked a dozen years or more in wood products. Mill workers have probably worked at their current job for the past six years; loggers change employers more frequently. The median income of the core labor force is about $12,000 per year, almost all of which is derived from labor earnings. Unemployment rates are minimal within the core labor force, especially for mill workers. Even loggers, subjected to more weather problems, draw far less unemployment compensation (perhaps two weeks, on the average) than is attributed to the false stereotype who 'sits all winter.'
>
> "The peripheral labor force (40,000 to 45,000 workers) is a more heterogenous group, especially in terms of their labor force participation. One significant sub-group is that of seasonal student workers, about 14,000 in number. This group is in the

labor market for only part of the year, earns a modest income ($2,250 median), and has had a low historical unemployment rate (3.0 per cent). The remainder of the mobile category, about 30,000 workers total, are largely committed to the labor market on a year-around basis. They are predominantly young (31 years old, on the average) and have typically spent more time in non-wood products jobs than in wood products jobs. They have changed jobs frequently, averaging only 1.5 years at each job. The key characteristic of this group is that they are successfully adaptive, at least to this point in time. While their historical unemployment rate is slightly higher than the statewide-average (10 versus 7 per cent), their median labor earnings ($7,875 in 1972) are roughly the same as for all semi-skilled workers on a state-wide basis."

Quality of Life

No attempt will be made in this section to describe all the indicators that ordinarily might be included in a discussion of the quality of life. The emphasis will be on describing those aspects that may be affected if the proposed action is approved.

Cost of Living. According to the Oregon Department of Economic Development (DED) "many" residents of Josephine County "believe the cost of living is relatively high" (Lowenberg, 1975, p. 30). This finding is substantiated by data provided by the Oregon Department of Human Resources (Kohl, 1976) and may be illustrated by three items of comparison between Josephine County and the State.

	Josephine County	Oregon
1) Per capita income (1974)	$3,977	$5,284
2) Retail sales per capita (1974)	$2,965	$2,713
3) Per capita income divided by retail sales	75%	51%

While these figures cover only a portion of the personal income/ expenditure spectrum and to some extent reflect an economy based on tourism more heavily than the State average, they illustrate that the cost of living in Josephine County may be high.

Crime. Indexed crime rates for Josephine County in 1975 were substantially lower than the statewide average. The violent crime rate in the county was 188; for the State it was 367. The property crime rate for Josephine County was 4,712; for the State the property crime rate was 5,897. All rates are per 100,000 persons.

Health. One method of ascertaining health is to investigate the number of individuals "at risk," they are those, age 18 through 64, who are partially or completely limited in their ability to carry on their major activity, i.e., work, keep house, go to school (Kohl, 1976, p. 18). Comparative figures for county and State are shown on the next page.

		County	State
1.	Physically handicapped	8.4%	8.0%
2.	Developmentally disabled	1.6%	1.6%
3.	Alcohol and drug dependent	1.7%	2.1%
4.	Personal and interpersonal maladjusted	2.3%	2.3%

Population Density. In 1976 the county-wide population density was approximately 29 per square mile (Portland State Univ., C.P.R.C., 1976). According to the Amundson Associates, (S.O.F.C.U., December 1974), population density based on county census divisions varied from a low of about .5 persons to a high, in Grants Pass of about 1800 persons per square mile.

In other words, crowding is not a problem. Isolation, on the other hand, is not a significant factor in the population distribution. These coupled observations constitute a very favorable rating of population density.

Taxation. As the Oregon Department of Economic Development submits (1975, p. 63), "there is no State sales tax and in Josephine County ... no county tax." The assessed valorem tax per $1,000 of assessed value was $17.53 in 1974. This compares to a statewide average rate of $24.18. The low tax rate is ambiguous as an indicator of the quality of life, since it says nothing about the availability of public services.

Other. Such indicators of the quality of life as educational facilities and opportunities, health care facilities and medical personnel, water and air quality, etc. are regarded as good to excellent by the DED (1975, p. 14 and following).

2.1.4 Existing Land Use

The total area of the Josephine SYU is 856,844 acres, of which 425,720 acres or 49.7 percent are public lands (an exact breakdown of land jurisdiction appears in Table 1-2).

Long before it was codified in the Federal Land Policy and Management Act of 1976, BLM subscribed to the principle of multiple use. The Bureau planning system described in Section 1.8.1 is the mechanism for deriving the combination of land and resource commitments which will meet the needs of the American people.

2.1.4.1 Timber Management

Timber management is the dominant use of public land in JSYU. The present allowable cut provides for the harvest of 146 million board feet (Scribner) per year. The commercial forest land base upon which that level of cut was determined amounted to 334,500 acres. The proposed action identifies a commercial forest land base of 222,896 acres and an allowable cut of 94 million board feet.

Comparison of the present allowable cut with the proposed action discloses the 1970 commercial forest land base to be 79 per cent of all public lands within JSYU, while the proposal establishes a commercial forest base of 54 per cent of the total public lands. See also Section 1.9.

Annual Timber Sales

The current timber management plan was implemented beginning in fiscal year 1972 (July 1, 1971) and is subject to the principles of multiple use, sustained yield, and environmental quality. Annual timber sale plans of the Medford District contain site specific information on individual proposed timber sales. Information listed in an annual plan includes the location of the proposed sale, approximate volume to be harvested, cutting practices to be followed, method of logging, road construction and access requirements, special contractual provisions and other relevant data. Table 2-57 summarizes data on timber sales in JSYU under the current allowable cut plan.

Forest Development

The allowable cut plan recognizes a necessity for prompt regeneration of areas receiving final harvest cut. Annual programs for artificial regeneration, stand improvement, and site conversion are among the silvicultural practices employed to achieve full productivity from commercial forest lands. Table 2-58 shows the acreage by practice which has been treated during the present allowable cut plan period.

Disruptive Factors

The timber management program in the Josephine SYU is influenced and can be altered by certain natural or man-caused phenomena. An annual timber sale

Table 2-57

Timber Sales: Josephine SYU

Fiscal Year	Volume (M.bd.ft)	Acres Involved Clear Cut	Acres Involved Partial Cut
1972	146,151	848	9,345
1973	154,579	1019	10,280
1974	140,715	650	9,533
1975	143,126	677	8,957
1976[1]	174,996	965	14,945
1977[2]	146,000		

1 15 month fiscal year
2 Planned for fiscal year, no breakdown of cutting practices

Sources: BLM Monthly Timber Sale Summaries

Table 2-58

Management Practices

Treatments	FY 72	FY 73	FY 74	FY 75	FY 76[1]	FY 77	FY 78[2]
	Approximate Acres Involved						
Transportation System							
Miles of permanent road constructed	120	122	101	75	102	96	76
Miles of existing road reconstructed	83	108	95	92	88	45	60
Shelterwood Harvest							
Initial Cut	9345	10280	4533	8957	14945	5226	0
Regeneration Cut	0	0	0	0	0	5330	6813
Final Harvest Cut	0	0	0	0	0	0	0
Clearcut	848	1019	650	677	965	785	1556
Slash Disposal							
Burning	0	0	0	0	0	0	500
Gross Yarding (including machine piling)	0	0	0	300	500	1000	2000
Site Preparation							
Herbicide	0	0	0	0	0	180	180
Mechanical Scarification	0	0	116	0	15	130	150
Planting							
Replant and Interplant (existing non-stocked or understocked clearcuts)	1948	1226	1220	787	681	1720	1500
Initial Planting (new clearcut & shelterwood regeneration cut areas)	0	0	0	0	0	0	1000
Replant & interplant (new cutting areas not adequately stocked by initial planting. Includes areas receiving overstory removal)	0	0	0	0	0	0	0
Herbicide Release	0	0	0	0	0	423	239
Precommercial Thinning	23	0	59	9	9	300	300
Fertilization	0	0	0	0	0	0	0
Commercial Thinning	0	0	0	0	0	300	300

1 Fifteen month fiscal year
2 Planned for fiscal year.

Source: Medford District, BLM, 1977.

plan is designed with the normal situation in mind. Occasionally, insect populations may grow to epidemic proportions or a single catastrophic event, such as a fire or windstorm of major proportions, may occur. When this happens changes in the timber harvest plan may result. Changes could take on the form of 1) selection of different methods of harvesting timber, 2) accelerating the annual cut over a period of time, 3) altering the locations of timber harvest and/or marketing areas, or 4) creating the necessity for unusual rehabilitation programs in the area.

Several categories of events can disrupt normal situation planning. Four of these are discussed previously: Section 2.1.1.1 Storm Events, Section 2.1.2.1 Tree diseases, Section 2.1.2.2 Forest Insects and Section 2.1.1.5 Wildfire Occurrence.

Trespass, the unauthorized cutting and/or removal of forest products, i.e., timber, Christmas trees, cedar shake bolts or posts, and firewood, occurs with varying degrees of regularity throughout the Josephine SYU. As the value of these products (especially high-quality cedar) increases, the incidence of willful trespass also increases.

Compounding the problem is the fact that, in recent years the high cost of heating fuel has resulted in a tremendous increase in the demand for firewood. Quite often, high-quality sawtimber is cut into firewood lengths and removed by otherwise honest, law-abiding citizens who are completely unaware of its value.

2.1.4.2 Agriculture and Grazing

Agriculture

Some 70 per cent of the Josephine Sustained Yield Unit lies within Josephine County. Land use does not differ sharply in the adjacent counties which make up the balance of the SYU. The approximately 38,500 acres devoted to agriculture in Josephine County provide the base to estimate 55,000 acres of private land devoted to agricultural purposes in the entire SYU. No public lands are used for authorized agricultural purposes in the SYU.

Private agriculture consists mostly of small beef and dairy farms on the flood plains and adjacent low hills of the Rogue River west of Grants Pass, the Applegate River and Williams Creek Valley south of Grants Pass, Cow Creek east and west of Glendale, and in the Upper Illinois River Valley south and east of Cave Junction. Many small single-family subsistence farms are scattered throughout the SYU. Farmlands comprise a mixture of high value irrigated cropland, irrigated hay fields, and non-irrigated grazing pasture. The general agricultural areas are depicted on Figure 2-37.

Grazing on Public Lands

Livestock grazing on BLM-administered lands in the Josephine Sustained Yield Unit is authorized by Section 15 of the Taylor Grazing Act of June 28, 1934. Grazing leases specifically on revested Oregon and California Railroad

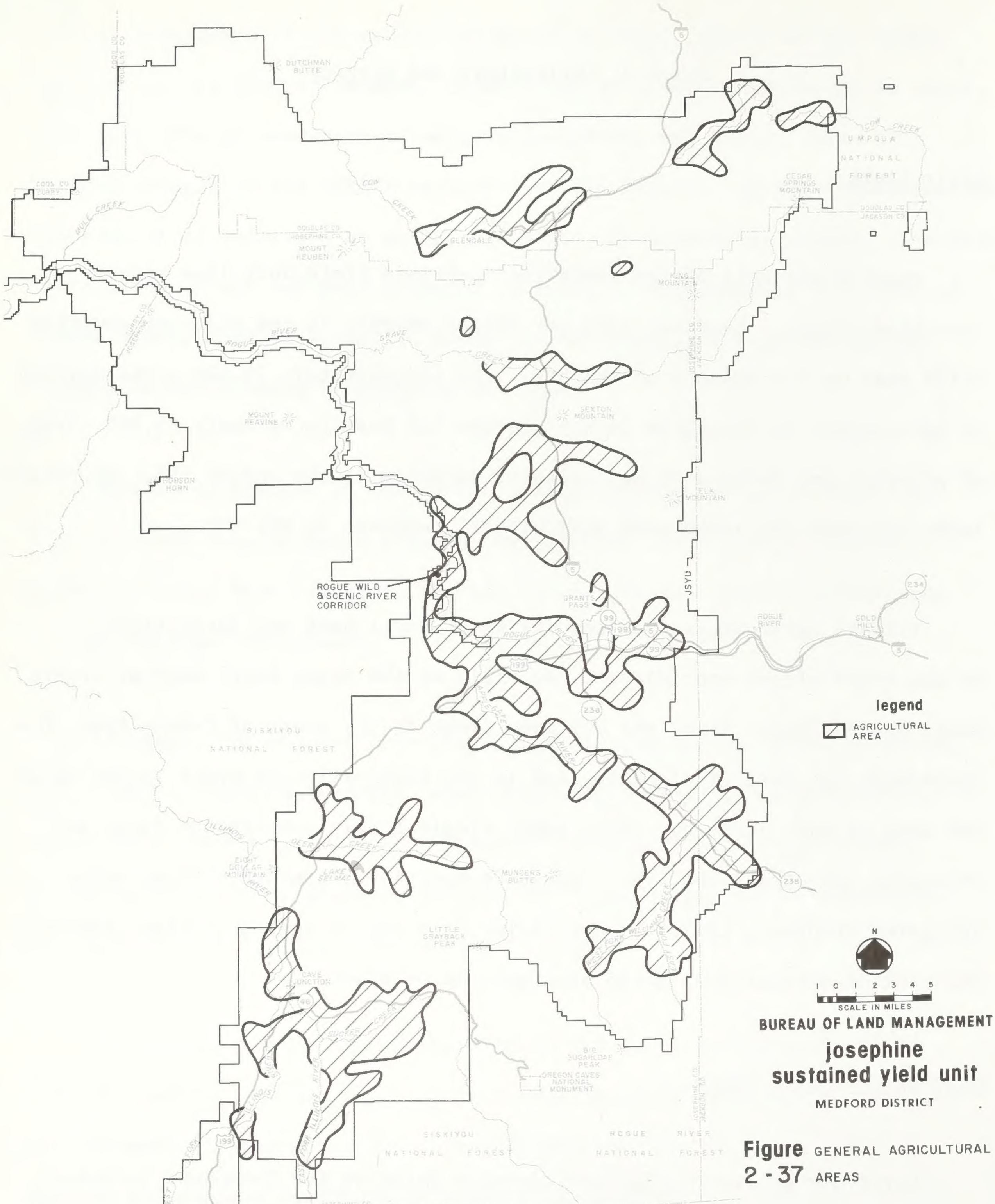


Figure 2 - 37 GENERAL AGRICULTURAL AREAS

lands are authorized by Section 4 of the Act of August 28, 1937, but only when they do not interfere with production of timber or other purposes specified in Section 1 of the Act. Qualifications and preference order for obtaining grazing privileges are set forth in Title 43, Part 4121 of the Code of Federal Regulations.

There are at present nine grazing leases covering 9,399 acres of public lands. All are in Josephine County (Figure 2-38).

Due to a combination of liver flukes, lower manpower requirements, and lessee preference, cattle are the only class of livestock using the public lands at present. The parasitic liver flukes cause high mortality in sheep, while cattle can tolerate infection (Siegmund, et.al., 1967) At least one of the cattle lease areas was grazed by sheep in the past. Losses due to the flukes made it uneconomical to continue as a sheep operation. The land is vegetatively and topographically better suited to sheep or goat grazing.

The unit by which livestock forage on federal lands is quantified for production and use is the animal unit month (AUM). An AUM is defined as the amount of forage (of any combination of vegetative species) necessary for the subsistence, in a healthy state, of one mature cow (and calf under 6 months) for a period of one month. An animal unit is one mature cow (and calf under six months), five sheep, or equivalent numbers of other herbivorous species. Authorized grazing use is displayed in Table 2-59.

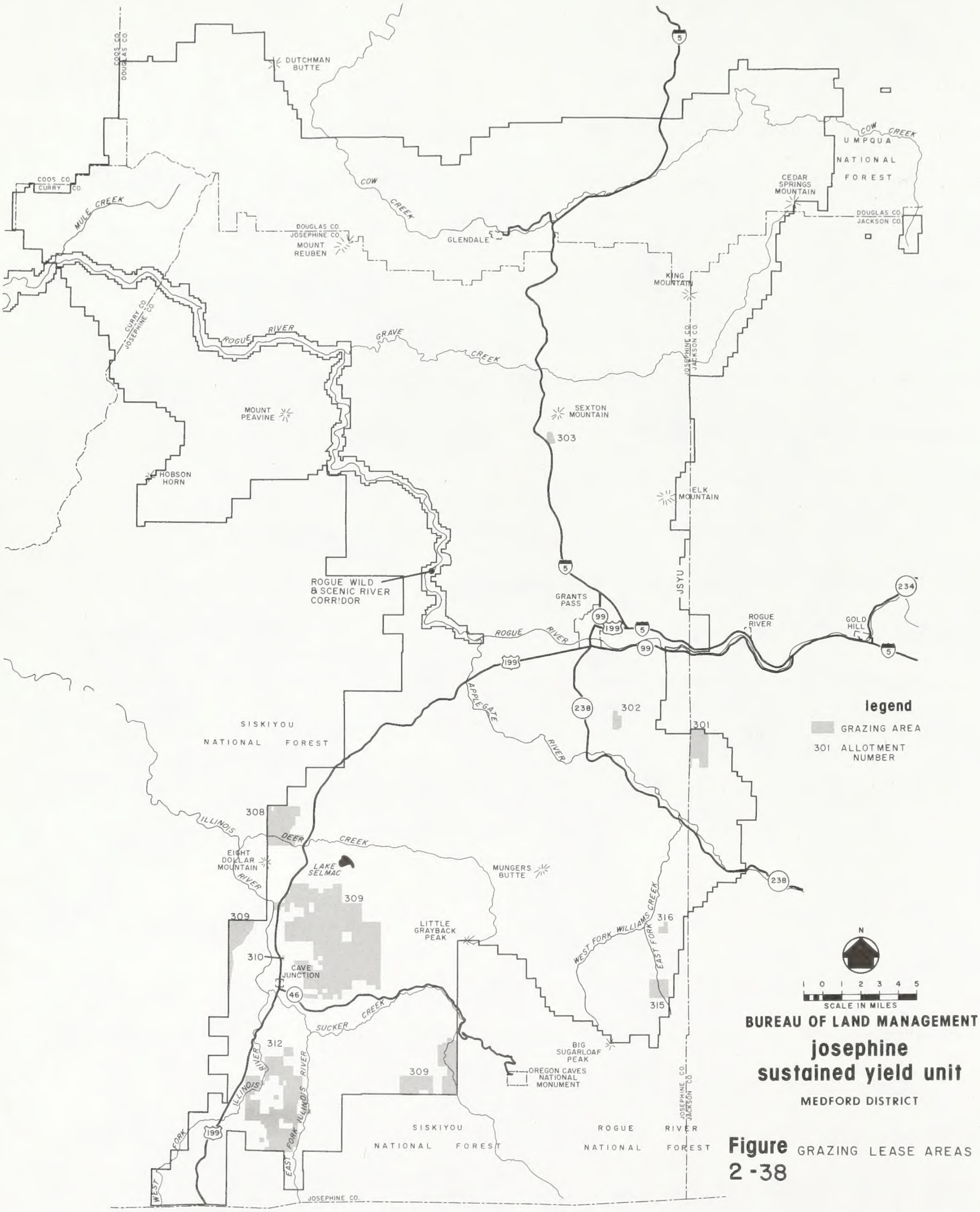


Figure 2-38 GRAZING LEASE AREAS

Table 2-59

GRAZING LEASES

LEASE NAME & NO.	LEASE AREA (ACRES)	ALLOWABLE USE (AUMS) 1/	NORMAL SEASON OF USE	FORAGE PRODUCTION (AUM'S) 1,2	WATER REQUIRED (1,000 gl) 3/
Gillaspey 301	1180	70	4/16-9/15	70	21.0
Rich 302	280	30	4/1-8/31	30	9.0
Johnson 303	30	8	4/16-5/15	8	2.4
Iverson 308	1165	77	4/1-6/15 10/16-12/15 10/16-12/15	77	22.1
Sauer 309	1672	96	4/16-715	96	28.8
Pfohl 310	15	3	11/1-2/29	3	.9
Duval 312	4457	141	4/1-6/31	150	45.0
Freeborn 315 560	560	17	4/20-7/31	17	5.1
Brown 316	40	5	4/1-5/30 9/1-10/15	5	1.5
SUB TOTAL				456	135.8
TOTAL	9399	447		456	135.8

1/ AUM = Animal Unit Month = Amount of forage necessary to graze one animal unit for one month; an animal unit being one mature cow (and calf under six months) or the equivalent.

2/ Estimated

3/ Based on 300gl/AUM

Most of the lessees are small farmers who produce irrigated hay on their own land, generally only enough for winter feeding. They are dependent on public lands and Forest Service lands for spring and summer forage for their cattle.

Most land in the grazing allotments lies between 2,000 and 3,000 feet in elevation. Much of the terrain is steep and covered by dense brush stands. Grazing is not allowed on public lands before April 1, and sometimes not before April 15, due to wet soil conditions in the early spring. The grasses normally dry up around July 15 after completing their growth cycle. Cattle tend to concentrate on the better grass, shrub, and wet meadow areas. Overuse to some extent is recognized in these areas. Water is available to livestock from surface sources and springs. Authorized livestock numbers use about half an acre foot of water during the grazing season (Table 2-59).

Neither range surveys nor conditon and trend studies have been conducted on the grazing leases. District personnel conclude by visual observation that grazing values are not high. The high percentage of intermingled private lands and the absence of exchange-of-use agreements make regulation of use difficult and preclude the development of regular allotment management plans (AMPs). Consequently, there are no AMPs in effect in the Josephine unit. However, there is a Soil Conservation Service plan on one lease area, and an Interagency Coordinated Resource Plan written on the combined areas of two other leases. These plans cover the majority of the public lands being grazed, with the remainder administered according to the stipulations of each lease.

There are no grazing management facilities on the lease areas except for a few unrecorded drift fences to keep livestock out of private lands. Two operators trail between private land, public lands, and Forest Service lands. Most trail grazing occurs along county road rights-of-way.

Trespass on public lands of goats, horses, and cattle belonging to people living on unfenced private property adjacent to public lands is a general problem in the Josephine unit. The problem is difficult to cope with because of lack of manpower to detect trespass and enforce regulations and lack of identifying brands on the livestock.

There are no wild horses or burros in the Josephine area. Any horses or burros found on public lands are either estray or in trespass.

2.1.4.3 Mining

Mining activities in the Josephine SYU are primarily in the two categories of locatable minerals and saleable minerals. Locatable means minerals that are subject to claim under provisions of the Mining Law of 1872, as amended. Mineral materials subject to location in the SYU have included gold, silver, copper, chromium, mercury, manganese, molybdenum, lead, and zinc. Saleable minerals have included quarry materials (sand, gravel, and crushed rock).

There are no known leasable minerals within the Josephine SYU. Leasable minerals include oil, gas, and other designated minerals.

Saleable quarry products account for the majority of the mineral activities in the SYU. Crushed rock and gravel are used extensively in the construction and surfacing of roads associated with the Timber Management Program. Building and maintaining roads requires about 215,000 cubic yards per year in the SYU. This material is obtained under contract sale from specified sites administered by the BLM. No private damand for saleable materials exists presently in the SYU; private lands supply all demand for aggregate, sand, and road surfacing material.

2.1.4.4 Transportation and Utility Networks

Public transportation systems in the Josephine Sustained Yield Unit are limited by the rugged physical relief and low-to-moderate population density. Although major highways are few, the secondary ground transportation network is extensive, providing access primarily for logging and forestry practices of public land management agencies and the timber industry.

Figure 2-39 shows airstrips, major highways and roads, railway lines, and the Rogue River Trail. Detailed maps showing the location of BLM, county and some private roads are on file in each resource area office of the Medford District.

Figure 2-39 MAJOR TRANSPORTATION NETWORKS

Ground Transportation

Highways

Interstate Highway 5 serves the west coast from Mexico to Canada, paralleling and sometimes coinciding with the old U.S. Highway 99. From Medford, southeast of the sustained yield unit, it proceeds westerly to Grants Pass and then northerly to Roseburg and Portland. Average traffic count on I-5 seven miles north of Grants Pass was 10,380 vehicles per day in 1975, according to Traffic Volume Tables for 1975, p. 218. That publication is also the source of data below.

U.S. Highway 199 runs from Grants Pass southwest through Cave Junction into California. Average traffic count on U.S. 199, at a point one mile north of the California-Oregon State line, was 1,965 vehicles per day in 1975.

State Highway 46 runs eastward from Cave Junction some 20 miles to Oregon Caves National Monument. Average traffic count on State Highway 46, at a point about 2.5 miles east of Cave Junction, was 960 vehicles per day in 1975.

State Highway 238 runs southward from Grants Pass to the Applegate River and follows the river upstream, exiting the SYU near Applegate community. Average traffic count on State Highway 238, at a point about 16 miles southeast of Grants Pass, was 800 vehicles per day in 1975.

Secondary Roads

All counties within the SYU have established extensive road systems providing access from valley situated areas, predominantly private lands, to the State highways. County roads provide the link between highways and timbe roads systems.

BLM Roads

The BLM road system in the Josephine SYU contains approximately 1,900 miles of road including 142 miles of jeep (4 wheel drive) road. Of these, 1,126 miles are pit-run rock surface, 483 miles are crushed gravel surface, and 149 miles are bituminous surface. The basic BLM road system is shown in Figure 1-1. Approximately 13,000 acres of land are classified non-forest by virtue of their being occupied by roads.

BLM-administered roads are constructed to standards necessary to carry logging traffic and equipment for logging activities. Mainline roads have better grade and alignment, and their surfaces are often treated with gravel or bituminous material. Surface widths range from 17 to 24 feet. Tributary feeder and spur roads are constructed narrower and steeper than the mainlines, with pit-run (unprocessed) rock or natural dirt surfaces 12 to 17 feet wide.

Major access roads have been constructed with appropriated funds under Federal Highway Administration (FHWA) contracts. These roads are listed by

name and number in Table 2-60. Until recently FHWA also performed a road maintenance function under contract to BLM for portions of the road system. On October 1, 1976, BLM assumed the maintenance role directly and absorbed FHWA personnel and equipment.

Maintenance of the BLM-administered road system is accomplished directly by BLM or through maintenance provisions of road use agreements, right-of-way permits, and timber sale contracts. Annual road maintenance plans are prepared and updated as necessary, based on anticipated loghauling schedules of purchasers and permittees. Therefore, some roads get very little or infrequent repair, while others are maintained on a regular basis.

Perpetual exclusive easements allowing BLM control are now obtained from owners whose lands are crossed by roads. Exclusive easements for BLM roads across private lands are of sufficient width to accommodate the proposed road design.

Right-of-way and road-use agreements replace easements with other governmental agencies, or large land owners to reduce the number of individual easements required. Many agreements stipulate specific maintenance responsibility. An agreement has two parts: the agreement, which delineates the rights of the government, and the permit, which delineates the rights of the second party. Site specific documents, under the umbrella of an overall agreement, provide for road use or construction by either party with mutual approval. The road use agreements now in effect within JSYU are listed in Table 2-61.

Table 2-60

Major Access Roads[1/]

Name and Designation[2/]	Length (miles)[3/]
Snow Creek Road (32-3-5)	7.5
Cow Creek Road (33-7-2)	10.9
Grave Creek Road (34-5-10)	14.6
Whiskey Creek Road (33-8-26)	5.0
Bobby Creek Road (32-9-14.4)	6.5
Deer Creek Road (38-7-13)	8.9
Powell Creek Road (38-5-15)	4.8
Mt. Reubin Road (34-8-1)	4.4
Almeda Road (34-8-13)	3.6
Galice Access Road (34-5-36)	23.1
Cedar Flats Road (39-5-6)	9.0
Kelsey-Mule Road (32-8-31)	10.3
Dutch Henry Road (31-7-19.3)	8.5
West Fork Cow Creek Road (32-8-1.1)	9.5

1/ The term "access roads", as normally employed refers to those roads constructed with appropriated funds to gain access to large blocks of harvestable timber.

2/ Numerical designations are applied to all elements of the BLM transportation system for record keeping purposes.

3/ In some cases access roads (appropriated fund construction) have been extended by construction requirements of timber sale contracts. The indicated length includes both funding methods.

Table 2-6 [1]

Road Use Agreements

Agreement Number	Permittee	Effective Date
BLM/Oregon State	State of Oregon	1/6/60
M-605	The Robert Dollar Co.	3/13/61
R-656	Longview Fibre Co.	4/3/62
M-700	Douglas Veneer-Roseburg Lmbr	5/17/63
R-751	Douglas Veneer-Roseburg Lmbr	7/7/64
M-824; R-824	C & D Lumber	1/6/67
M-870	Rogue Valley Trees-Edwin C. Smith	8/26/68
BLM/USFS	U.S. Forest Service	7/24/69
M-887	The Robert Dollar Co.	11/17/69
M-868	Giustina Bros.	1/4/71
M-660	Boise-Cascade Corp.	8/25/61
M-1006	Mountain Fir Lumber Co.	3/27/74

Other Elements

The only regularly maintained foot trail in the unit is the Rogue River Trail. It is 24.3 miles long and maintained to a 30-inch treadway. It is in good condition and closed to motorized vehicles. Numerous other old forest trails exist in varying condition.

Off-road vehicles, including motorcycles, use jeep trails, skid trails, fire breaks, and other roadless but accessible areas in recreational pursuits (Section 2.1.3.1 and Figure 2-23).

Air Transportation

Josephine County maintains a county airport at Merlin, four miles north of Grants Pass. The 75-by-4000 foot asphalt-surfaced runway is in good condition, lighted, and has a 19,000-pound single-wheel weight restriction.

The Illinois Valley Airport, operated in conjunction with the U.S. Forest Service smokejumper base, is three miles south of Cave Junction on U.S. Highway 199. It has an asphalt surface and can be lighted on request. USFS has maintenance responsibility for the 75-by-5200 foot runway, which has a restriction of 20,000 pounds wheel weight.

The Calvert Peak airstrip was constructed by the BLM about 18 miles west of the town of Glendale. Its 3000-foot gravel-surfaced runway is

in fair condition and maintained by BLM on a periodic basis, primarily used as an emergency fire suppression facility. It is not open to the public.

Hughes Airwest and United Airlines offer direct and connecting commercial flights out of the Medford Airport, about 25 miles east of Grants Pass. A commuter airline, Executive Flight Service, Inc., serves Roseburg, 60 miles north of Grants Pass. Air charter service is available at Roseburg, Medford, and Josephine County Airport near Merlin.

Commercial Ground Transportation

Bus Service

Commercial buses traverse the Josephine area from the north down Interstate Highway 5 through Grants Pass on to California, and from Grants Pass down US Highway 199 to California (Loy, et al. 1976).

Railroads

The Southern Pacific railroad comes from California up through Medford, following the basic route of Interstate 5 to Grants Pass, where it meanders northward to the community of Wolf Creek, and from there northwest through Glendale on its way to Roseburg. The railroad provides commercial freight service but does not carry passengers (Loy, et al. 1976).

Water Transportation

There is no commercial transport of goods via water within the SYU. Several of the larger streams were used for that purpose in earlier days, however.

Today several of the larger streams are used as travel routes during the recreational season. Most noted for this use is the Rogue River for its entire length within the unit. Use figures for that portion of the Rogue within the wild and scenic area are given in Section 2.1.3.1.

Other streams seasonally used for recreation-oriented water transportation include the Applegate and Illinois Rivers. Late summer use is often affected by irrigation drawdown which makes them too shallow to traverse.

Utility Systems

There are approximately 66 miles of rights-of-way for utility systems on public lands in the Josephine SYU. The right-of-way grants vary in quantity of acreage affected, because of variation in length and width of each grant. For instance, a 100 foot wide right-of-way for one mile involves about twelve acres, while a grant for a 200 foot wide right-of-way for one mile encloses about 25 acres. They limit surface management within their boundaries and necessitate special provisions for timber harvesting in their immediate areas.

Construction road and service road rights-of-way over public lands are sometimes required for access and maintenance of facilities. There are designated utility corridors in the SYU where all future major utility transmission lines are to be located. These corridors are shown on Figure 2-40.

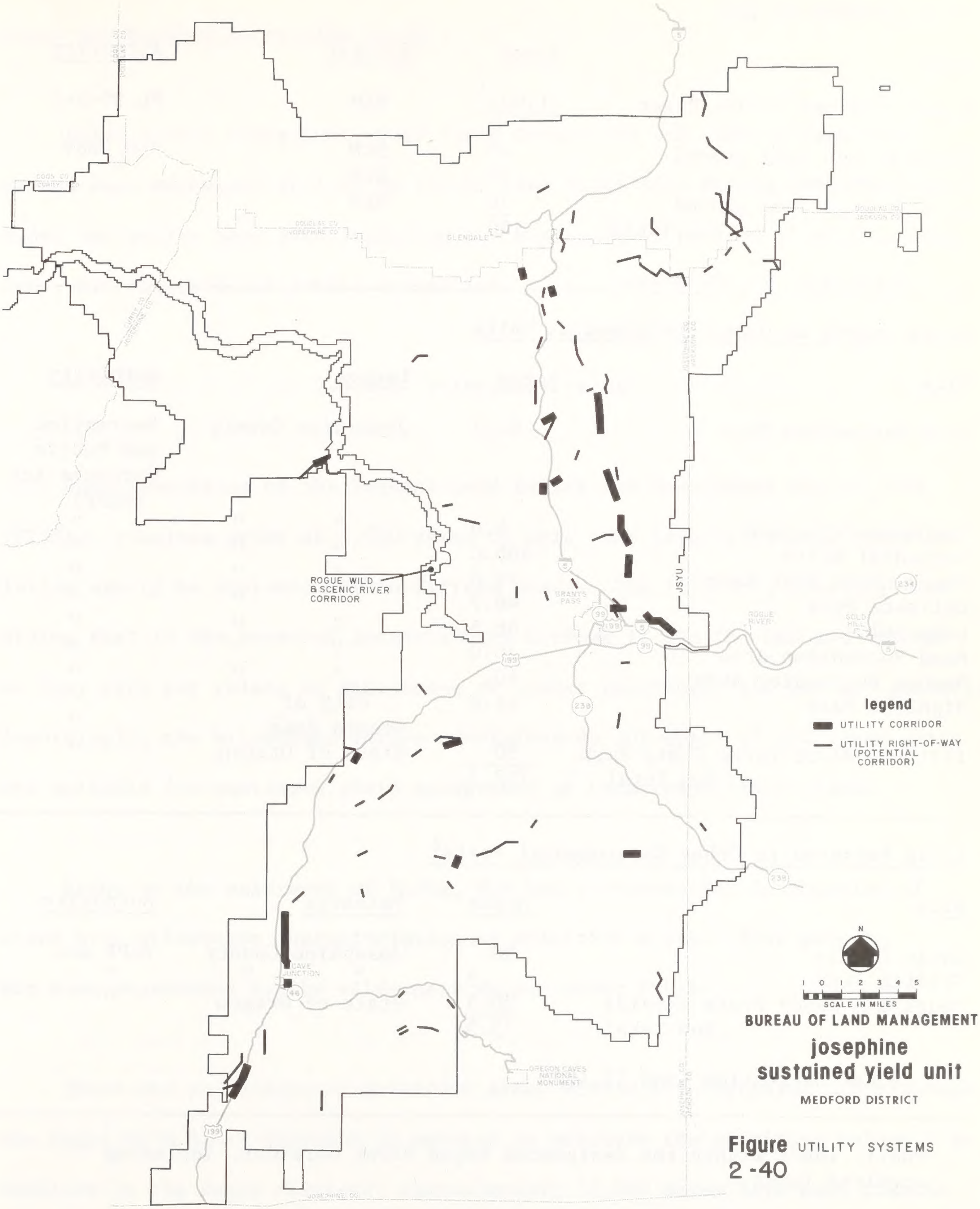
2.1.4.5 Recreation

All of the public lands within the Josephine SYU are available for dispersed recreation. Over 11,000 acres, mostly along the Rogue River, are specifically utilized or withdrawn for recreation purposes. Table 2-62 summarizes these recreation lands. Figure 2-21 shows the location of all public recreation sites throughout the Josephine SYU.

<u>Rogue River Lands</u>

Two partially overlapping recreational withdrawals exist along the Rogue River downstream from the confluence of the Applegate River.

The Wild and Scenic Rivers Act, Public Law 90-542 (1968) has withdrawn approximately 11,087 acres of public lands within one-quarter mile of the banks of the Rogue River for the preservation of scenic, recreational, geologic, fish and wildlife, historic, cultural, or other scenic values (Table 1-4). This withdrawal segregates the public lands from entry, sale, or other disposition under the public land laws and the mining and mineral leasing laws.



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT

Figure 2-40 UTILITY SYSTEMS

Table 2-62

Recreation Lands, JSYU

Lands Managed by BLM

Site	Acres	Manager	Authority
Rogue Wild and Scenic River	11,087[1]	BLM	PL 90-542
Shady Branch Camp ground	40	BLM	PLO 3869
Deer Creek Camp ground	40	BLM	"
Cold Springs Camp ground	70	BLM	"
Sub Total	150		

Total BLM 11,237 acres

Lands Leased to Other Governmental Units

Site	Acres	Lessee	Authority
Argo Recreation Site	82.7	Josephine County	Recreation and Public Purposes Act (R&PP)
Carpenter's Island	4.0	" "	"
Cathedral Hills	400.0	" "	"
Grave Creek Boat Ramp	22.8	" "	"
Hellgate Park	46.7	" "	"
Lake Selmac	48.5	" "	"
Rand Recreation Area	26.0	" "	"
Reuben Recreation Area	40.	" "	"
Highland Park	41.8	City of Grants Pass	"
Illinois River Forks State Park	80	State of Oregon	"
Sub Total	792.5		

Lands Patented to Other Governmental Units[2]

Site	Acres	Patentee	Authority
Ennis Riffle	50.	Josephine County	R&PP Act
Griffin Park	.3	" "	"
Rough and Ready State Wayside	20.5	State of Oregon	"
Sub Total	73.5		

Total Recreation Land 12,103

1 Public lands within the designated Rogue River Corridor, including acquired lands.

2 Title passed to local government under provisions of the Recreation and Public Purposes Act. Each title document contains a clause for reversion of lands to the United States if not used in conformity with the provisions of the grant.

Other BLM Managed Recreation Lands

Shady Branch Campground, Deer Creek Campground and Cold Springs Campground were withdrawn in 1965 by Public Land Order 3869 from appropriation under the public land laws including the mining laws, but not mineral leasing laws, and reserved for public recreation.

2.1.4.6 Wilderness Values

Under the terms of the Federal Land Policy and Management Act of 1976 (FLPMA), roadless areas of 5,000 acres or more that have wilderness characteristics are to be reviewed within fifteen years. The 1976 Act, however, also states that in the event of inconsistency between it and the O&C Act insofar as they both may relate to management of timber resources, the O&C Act prevails. Accordingly, the wilderness review provisions do not apply to O&C lands which are suitable for sustained yield management as commercial timber lands.

Prior to the enactment of FLPMA, BLM had a process for designation of areas with wilderness characteristics as primitive areas. This process has been superseded by the wilderness review under FLPMA.

There are no designated primitive areas within the Josephine SYU although the Rogue Wild River Corridor is managed to maintain its primitive values. In addition to the Rogue corridor, approximately 33,800 acres have been identified as meeting broad primitive area criteria under pre-FLPMA procedures. As

such, they provide opportunities for renewal of the spirit, solitude, a feeling of isolation, and being removed from the impacts and artifacts of human use. Most of this land is in the vicinity of the Rogue Wild River. Locations are shown on Figure 2-23. Portions of these potential primitive areas are too rugged for recreation but are important for human-intolerant wildlife.

An area of more than 9,000 acres north of the Rogue River has been referred to in Bureau Planning documents as the Mule Creek potential primitive area. The rugged terrain of most of the area has not been conducive to logging practices, so the area remains uncut. Some evidence of early gold mining exists and jeep trails enter exterior portions of the area. An unmaintained hiking trail provides access to the Interior.

A more extensive area traversed by the Rogue River has been identified as the Big Windy-Bunker Creek potential primitive area. This area contains about 24,000 acres, including over 2,900 acres of the Rogue Wild River corridor. While primary visitation is associated with the Rogue River, hunters, hikers, and sightseers recreate throughout the area. Some unimproved trails exist, and one controlled-access jeep road connects Black Bar Lodge on the Rogue with the Galice Access Road to the south. For the most part, wilderness values remain intact because the topography is not amenable to development for timber production. The area was heavily burned by wildfire several decades ago.

Red Butte is an unroaded, unlogged area of about 2000 acres in the southeast corner of the JSYU. Recreation activity is limited, consisting mainly of ORV use, hiking, hunting, and related sightseeing activities. Adjacent land in the Rogue and Siskiyou National Forests has been inventoried by the Forest Service as "roadless" and is included in the Red Buttes Wilderness Council's proposal for wilderness designation.

Based upon anticipated criteria for identifying wilderness study areas under FLPMA, only two tracts within the Josephine SYU are likely to be identified for such study. The acreages of these areas not suitable for sustained yield timber management are:

1. Mule Creek potential primitive area	7,834 acres
2. Zane Grey roadless area (within the Big Windy-Bunker Creek Area)	10,370 acres

Both areas contain land which also falls within the Rogue Wild and Scenic River corridor. This land is protected under provisions of the Wild and Scenic River Act. Both areas also contain high intensity timber management land within the commercial forest base which is proposed for protection pending completion of primitive area suitability studies.

	Gross Acreage	Acreage Within Rogue Corridor	High Intensity Land In Commercial Forest Base
1. Mule Creek potential primitive area	8,380	90	546
2. Zane Grey roadless area	11,860	2,968	1,490

The Mule Creek area is included in proposed legislation (HR 3454) which would add it to the wilderness system as a part of the proposed Wild Rogue Wilderness. Until Congress acts on H.R. 3454, the entire Mule Creek area will be managed to preserve its wilderness characteristics. In the interim, the portion of the two areas not suitable for commercial timber production will be studied for wilderness designation under Section 603 of FLPMA, along with all other lands not suitable for commercial timber production.

It is important to note that the acreages above and those included in the following discussion on instant wilderness study areas are approximate. They were developed in response to Bureau program requests. It is quite likely that these acreage figures will slightly change as Bureau-wide criteria and procedures for wilderness study areas become explicit.

In accordance with the BLM wilderness study provisions of FLPMA the Brewer Spruce Research Natural Area has been designated an instant wilderness study area. "Instant study areas" are those formally designated primitive and natural areas for which wilderness study reports must be submitted to Congress

by July 1, 1980. The Brewer Spruce Research Natural Area and adjacent roadless acreage will be reviewed, and recommendations will be made as to the suitability of this land for wilderness designation. Approximately 2090 acres of roadless land occur around the existing 210-acre Brewer Spruce RNA.

2.1.4.7 Miscellaneous Land Uses and Designations

There are several administrative procedures by which the BLM may authorize secondary, or specialized, use of public lands. Right-of-way permits are one such means. They are generally used to authorize roads, highways, utility lines, communication sites and lines, and pipelines. These are discussed under Transportation Networks, Section 2.1.4.4.

Withdrawals segregate areas of public lands for specific purposes such as for power projects, land or water reclamation, or recreation projects. Withdrawals also may segregate areas from the operation of specific public land laws, e.g., an area may be withdrawn from the Mining Law of 1872 in order to preclude prospecting on a developed recreation area.

Leases are authorized in certain cases. The types of leases being used in the Josephine SYU are Recreation and Public Purposes Leases (R&PP), Small Tract Leases, Mining Claim Occupancy Act Leases, Special Land Use Permits, and Section 15 Grazing Leases. Grazing leases have previously been discussed.

Designations to preserve areas of public lands for special uses, such as Research Natural Areas, are provided for by law. Such designations have no affect upon established use or managment of the sites involved.

Other "one-time" authorizations to use resources such as firewood, fence posts, building stone, gravel, or topsoil are on a short-term permit basis. Fees consonant with the fair market value of the resource are determined by an appraisal.

Research Natural Areas

Research Natural Areas are established and maintained for research and education and cannot be used in a manner which violates this primary intent. When necessary, the general public can be excluded or restricted in order to preserve the area.

The 210-acre Brewer Spruce Research Natural Area was established on January 29, 1965. The summit of Little Grayback Peak (elevation 5,445) and Rabbit Lake (a shallow, 0.5 acre pond) are within the designated area. The acreage has been set aside to protect an unusual association of plant species. Ten different species of conifers, including large amounts of Brewer spruce, are found here. The extensive brushfields are another outstanding feature. Sixty per cent is forest, 25 per cent is brushfield, and the remainder is bare rock outcrops and talus (Dyrness, 1972). No facilities have been provided within the Brewer Spruce Research Natural Area, nor is research activity currently being conducted. By July 1, 1980, the Brewer Spruce

Research Natural Area will be reviewed, and recommendations will be made concerning the suitability of this 210 acre plot and 2,090 acres of adjacent roadless area for wilderness designation.

A portion of Eight Dollar Mountain is being considered as a Natural Landmark by the National Park Service. Designation as a Natural Landmark would not affect BLM jurisdiction to manage the area, NPS is the Departmental lead agency in these investigations. The study is not yet complete, and no other data are available.

The Woodcock Bog area is expected to be recomended as a Research Natural area.

All three aforementioned areas are in the southwestern portion of the SYU (Figure 2-41).

Residencies

Small Tract Leases

Five-acre tracts leased under the Small Tract Act of June 1, 1938 (Repealed by P.L. 94-579) are occupied at two sites in the Josephine SYU. These sites are shown on Figure 2-41 and listed in Table 2-64. These leases have expired and cannot be renewed under the voided Small Tract Act, but are being reappraised. Residency will probably continue, although the type of leasing agreement is yet to be determined.

Mining Claim Leases

Two five-acre tracts and one 2.5-acre tract have been leased on a life tenancy basis. The leases were granted on a rental basis under the provisions of the Mining Claim Occupancy Act of October 23, 1962. These sites are shown on Figure 2-41 and listed in Table 2-63.

Proposed Power Projects

There are 23 power withdrawals in the Josephine unit, involving about 29,018 acres of public lands. The general purpose of these withdrawals is to reserve public lands for future construction of water impoundments for hydro-electric power production or for the complementing transmission facilities. While withdrawals for these purposes segregate the public lands from entry, location, and disposal, they have no direct effect on surface resource management unless the power facilities (including reservoirs) have been or are being constructed.

Eight of the power withdrawals are partially if not wholly included in the Rogue River Wild and Scenic River Withdrawal (see recreation section). This withdrawal of lands adjacent to the Rogue River precludes development of power projects and effectively nullifies the power withdrawals. Thirteen other power withdrawals have been determined to be superimposed or unused. In all, 21 of the 23 withdrawals in the SYU are recommended for revocation. Only Power Project #1045 and Power Site Reservation #658 are not to be revoked.

Table 2-63

Leases

Mining Claim Occupancy Leases

Serial No.	Date Granted	Acres	Remarks
OR 016378	2/3/66	5	Life Tenancy Mineral Estate Reserved Annual Rental
OR 013480	1/8/65	2.5	Life Tenancy Mineral Estate Reserved 5 Year Rental Period
OR 8227	11/74	5	Life Tenancy

Small Tract Leases

Permit No.	Lease Period	Expires	Acres	Remarks
OR 12835	5 Yrs	4/72	5	Being Processed
OR 012868	10 Yrs	2/74	5	Being Processed

Official restoration of public lands involving some 29,000 acres should take place in the near future.

Table 2-64 lists the power withdrawals by type, showing the agency or department initiating the action, acres affected, and other information. Figure 2-41 depicts the two viable withdrawals.

Unauthorized Uses

Occupancies

There are 72 registered cases of unauthorized occupancy in the SYU.

Thirty-one of these cases involve occupancy of unpatented mining claims known or suspected to be invalid. Filing of new mining claims of doubtful validity, with subsequent construction of dwellings, and the reactivation of previously inactive claims, with subsequent expansion and/or renovation of dwellings, frequently occurs. The Federal Land Policy and Management Act of 1976 requires that the owner of an unpatented mining claim must record that claim within three years from the date of the Act (21 Oct. 1976), and every year thereafter. Claims located after the date of the Act must be recorded prior to 31 December of each year following the calendar year in which the claim was located.

Table 2-64

Power Withdrawals

Withdrawal Type & Number	Initiating Agency 1/	Acres (Approximate)	Purpose	Remarks
Power Project # 853	FPC	3311	Unspecified	Along Illinois River
Power Project #1045	FPC	3.	Trans. Line	50' Each Side Center Line
Power Project # 903	FPC	6750	Unspecified	Along Rogue River
Power Project #1059	FPC	22	Trans. Line	50' Each Side Center Line
Power Project #1116	FPC	6	Trans. Line	" " " " "
Power Project # 437	FPC	322	Unspecified	Power For Mt. Reuben Mining Co.
Power Site Classification # 123	ID	640	Unspecified	Along Rogue River
Power Site Classification # 158	ID	72	Reservoir	Not Built (Applegate River)
Power Site Classification # 330 3/	ID	200	Unspecified	Grave & Jumpoff Joe Creeks
Power Site Classification # 143	ID	9640	" "	Along Rogue River
Power Site Classification # 167	ID	314	" "	Along Rogue River
Power Site Classification # 196	ID	6	" "	" " "
Power Site Reservation # 617	ID	140	" "	" Illinois "
Power Site Reservation # 618	ID	1600	" "	" " "
Power Site Reservation # 621	ID	1120	" "	" Rogue "
Power Site Reservation # 653	ID	66	Trans. Line	50' Each Side Center Line
Power Site Reservation # 658	ID	16	" "	" " " " "
Power Site Reservation # 623	ID	760	Unspecified	Along Rogue River
Power Site Reservation # 649 2/	ID	236	Trans. Line	50' Each Side Center Line
Water Power Designation # 10	ID	1640	Unspecified	Along Rogue River
Water Power Designation # 13 2/	ID	254	Trans. Line	50' Each Side Center Line
Water Power Designation # 18 3/	ID	300	Unspecified	Grave and Jumpoff Joe Creeks
Water Power Designation # 14	ID	1600	" "	Along Rogue River
TOTAL		29018		

1/ FPC = Federal Power Commission
ID = Interior Department
2/ These Two Withdrawals Overlap
3/ These Two Withdrawals Overlap

Numerous unregistered, unauthorized occupancies exist on public lands, both on and off mining claims. No estimate of acres involved is available. BLM registers and investigates cases as available manpower and funds permit. Determinations, final decisions and actions in these cases take more time than is usually available; thus a backlog of cases exists.

Water Facilities

Unauthorized use of public lands for domestic water includes wells, spring developments, ditches, and pipelines. Installation of these facilities is occurring more often with the increasing number of residences on or immediately adjacent to public lands. No data are available on the number of facilities constructed.

Dumping

Indiscriminate dumping occurs in isolated areas throughout the SYU, most frequently on or adjacent to occupied mining claims. When and if identified, persons suspected of dumping are requested to remove the debris from public lands. Local enforcement officials, e.g., county sheriffs, normally cooperate with BLM in dealing with violators.

Sanitary Landfills

The city of Grants Pass has a Recreation and Public Purposes lease on the Merlin Sanitary Landfill near the town of Merlin. The lease was

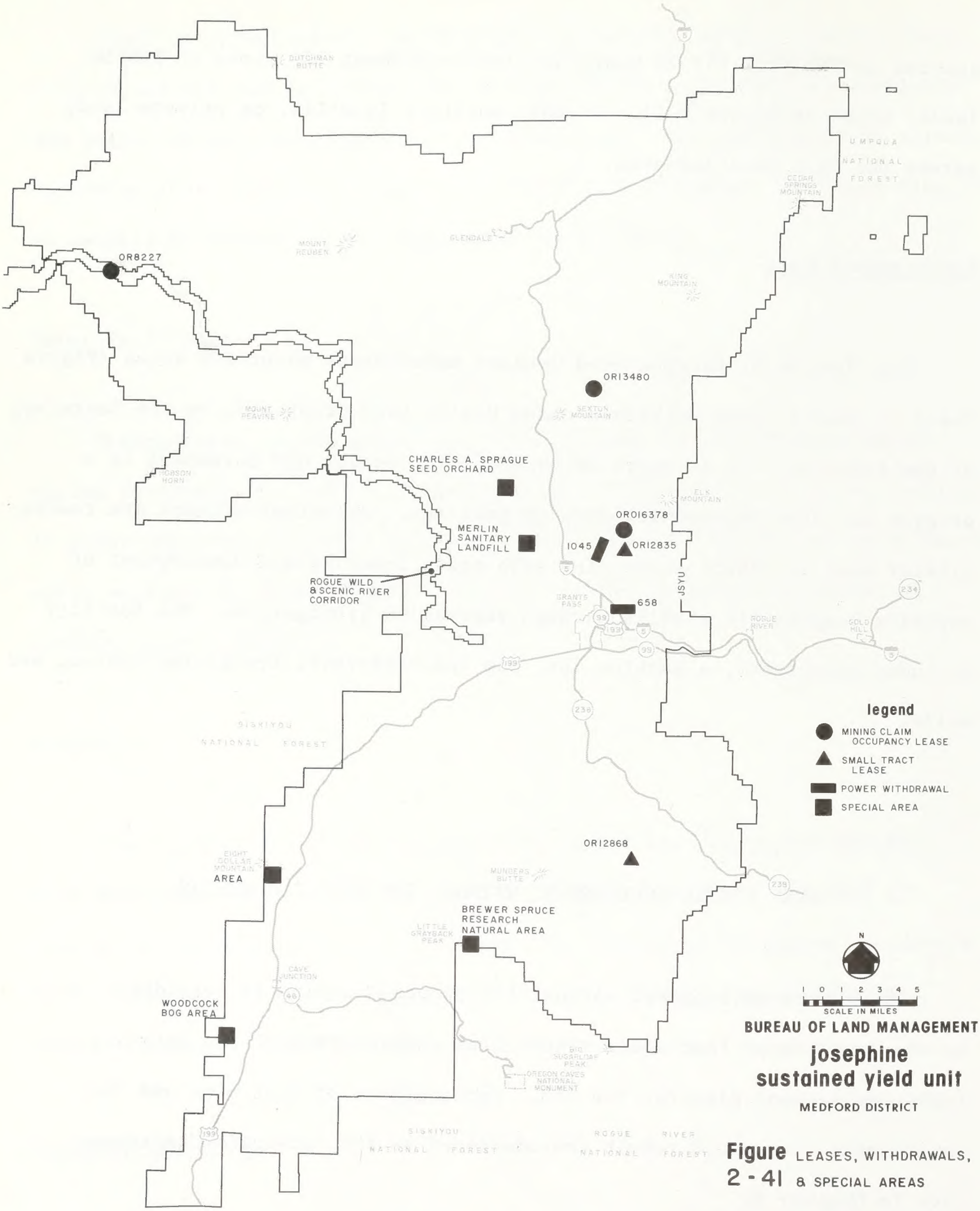
granted in May 1967 for 25 years and involves about 120 acres of public lands, shown on Figure 2-41. A small sanitary landfill, on private land, serves the Cave Junction area.

Experimental Site

The Charles A. Sprague Seed Orchard encompasses about 200 acres (Figure 2-41) of public lands withdrawn under Public Land Order 4132 by the Secretary of the Interior. It is operated by Medford District BLM personnel in a program for tree improvement through genetics. Principal efforts are toward blister rust resistant sugar pine with cross breeding and development of superior Douglas fir strains through vegetative propagation. The facility includes structures, a parking lot, dam and reservoir, irrigation system, and wells.

2.2 FUTURE ENVIRONMENT WITHOUT THE PROPOSED ACTION

The future environment without the proposed action is considered to be the environment that would result from continuation of the existing timber management plan for the SYU. Continuation of that plan and the environment that would result are addressed as the "no-action" alternative in Chapter 8.



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT

Figure 2-41 LEASES, WITHDRAWALS, & SPECIAL AREAS

3. IMPACTS OF THE PROPOSED ACTION

This analysis discusses impacts on individual environmental components by operations inherent in the proposed action. Two categories of operations are involved: those required for harvest and those required for the assurance and augmentation of future timber crops. Table 3-1 lists the individual operations, by operational system, and the general impactors (factors which cause impacts) associated with each. The operations are defined in Appendix T.

The many operations have been grouped into systems of similar operations. Within operational systems significant differences in impact intensity of individual operations are identified. The format of the analysis is similar to the format of Chapter 2 in that impacts are described under environmental component headings. A brief summary is provided immediately after each major environmental component heading. A tabular display of impacts, quantified to the extent possible, is also provided within each major component analysis. The degree of impact is determined by differences in impact intensity between the proposed plan and the existing plan (Section 1.9).

The proposed timber management plan was the product of land use planning which determined the maximum land area that could be utilized for timber production without environmental degradation. A synopsis of the land use allocations arrived at through this planning process and the rationale and multiple-use trade-offs for each of the allocations is presented in Chapter 1.

OPERATIONAL SYSTEMS SILVICULTURAL PRACTICES	ACREAGES	Chainsaw Operation	Operation of off road vehicles	Operation of on road vehicles	Operation of stationary engines	Log dragging (skidding)	Blasting	Excavation	Deposition of overburden	Herbicide Application	Road Grading	Sideslope Grading	Operation of scarifiers	Burning Vegetation	Application of Fertilizer	Felling Merchantable Timber Trees	Felling Non-commercial Living Trees	Felling Dead Trees (Snags)
1. Two-Stage shelterwood	*50,000	X		X												X	X	X
a. Regeneration cut	41,000	X		X												X	X	X
b. Final harvest	9,000	X		X												X		X
2. Clearcutting	5,000	X		X												X	X	X
3. Commercial thinning	4,700	X		X												X		X
4. Sanitation salvage	as necessary	X		X												X	X	X
YARDING/LOADING																		
5. Tractor methods	13,730	X	X	X		X												
6. Cable methods	45,970	X	X	X	X	X		X										
TRANSPORTATION SYSTEMS																		
7. New road construction	4,900		X	X			X	X	X	X	X	X	X	X		X	X	X
8. Road maint. & renovation	as necessary	X	X	X			X	X	X			X						
DEVELOPMENT AND PROTECTION PRACTICES																		
9. Slash disposal	*43,600	X	X	X	X	X												
10. Gross yarding/piling	33,500	X	X	X	X	X		X										
11. Burning	10,100		X	X										X				
12. Scarification	160		X										X	X				
13. Herbicide treatment	*47,700			X						X				X				
a. Site preparation	24,500			X						X								
b. Release	13,200			X						X								
14. Planting	*54,200		X	X										X				
a. Initial planting	41,000		X	X										X				
b. Replanting	13,200		X	X										X				
15. Fertilization	18,900			X											X			
16. Preeommercial Thinning	14,200	X	X															
17. Fire suppression	as necessary	X	X	X	X									X		X	X	X
18. Silvicult. insect/disease cont.	as necess.	X	X	X	X	X								X		X	X	X

* CLASS TOTALS

Two time frames are used in the analysis process. The short term is ten years, the planned life of the proposed timber management plan. The long term is defined as 60 years, to coincide with the approximate time it is estimated to take before all old growth is removed from commercial forest lands in the intensive management category. Other discrete time periods, pertinent to specific impact discussions, are utilized as necessary and are identified in the text.

A basic assumption of the analysis is that sufficient funding and manpower will be available for implementing the management plan as proposed. Where existing levels of data are inadequate to permit analyses of specific impacts, "worst case" and "most probable" impacts are qualitatively discussed. It is further assumed that the herbicide projects proposed are submitted through an annual Departmental review process (described in Section 1.6.4.2) each year prior to approval of any project.

3.1 PHYSICAL ENVIRONMENT

The impacts of the proposed action on the physical environment would be concentrated in three areas: burning of slash, disturbances to soil, and construction of roads.

The burning of slash would increase the levels of carbon monoxide, oxides of nitrogen, hydrocarbons, and particulates. The potential exists for the proposal to increase the level of particulate pollution above standards set by law; however, the project design features of the action would not allow burning to occur during weather that would cause concentrations of pollutants.

Disturbances to soil by compaction and surface disturbance would cause a reduction in productivity and erosion of some of the soil. Disturbances would be held to a minimum by close supervision of the timber sale by BLM personnel to ensure compliance with contract provisions.

Road construction would have impacts to water quality. Some road failure due to landslides would occur. Erosion from cutbanks and ditches would occur. Streams would carry more suspended sediment.

3.1.1 Climate

3.1.1.1 Silvicultural Practices

Two-Stage Shelterwood

Regeneration Cut

The impacts to the climate in the immediate vicinity of the regeneration cut areas (41,000 acres) would be caused by changes in the ambient air temperature extremes, evaporation rates (closely related to relative humidity of the air), and air movement. Such changes in localized areas are termed microclimatic effects.

Regeneration cuts are designed to provide enough shade so as to preclude lethal extremes of temperatures. However, localized problem areas would be encountered that could not be anticipated. An estimated 5,125 acres of the regeneration cuts would have some mortality of seedlings due to temperature extremes for the first five years. Over the long term the effects would lessen as stands mature, eventually disappearing entirely.

Evaporation rates in areas subjected to regeneration cutting would increase in direct proportion to the per cent of canopy removed. Relative humidities would decline in the cut areas from typically 80 per cent levels to ambient levels of 25 to 75 per cent. This would tend to dessicate herbaceous

vegetation earlier in the dry season (two to three weeks earlier by estimate). The effects would disappear after six to ten years.

Air movement would increase in the areas subjected to regeneration cutting The increase would be up to six times the level experienced near the ground in undisturbed forests. The impact of the increased air movement would be an estimated one tree lost to windthrow (uprooting of live trees by wind pressure) for each three acres subject to shelterwood harvest. This represents a loss of 16,600 trees, most of which would be salvaged within five years. The total loss would average ten board feet/acre/year (professional estimates, Medford District). This amount is of minor significance in the JSYU.

Final Harvest Cut

The impacts to the microclimate due to final harvest cutting under two-stage shelterwood would be insignificant on the 9,000 acres that would be involved. Stands of regenerated trees would be of such a density (three feet average height) that microclimatic effects would be nullified.

3.1.1.2 Transportation Systems

New road construction would occur on 4,340 acres of previously undisturbed forest lands. Impacts to the microclimate would be the same as for regeneration cutting; that is temperatures, evaporation rates, and air movement would be increased in extremes. An estimated 542 acres of forested lands adjacent to

the roads would receive some increased temperature extremes, resulting in more frost and higher surface temperatures. Windthrow would result in a loss of 180 trees per year, most of which would be salvaged within five years, an insignificant amount.

3.1.2 Air Quality

3.1.2.1 Silvicultural, Yarding and Loading, and Transportation Systems

Most operations involved in the silvicultural practices, yarding and loading practices, and transportation systems would impact air quality by creating internal combustion engine emissions and dust from vehicle movement. A total of 173,640 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery operating from internal combustion engines (yarders, chain saws, etc.). In assessing the amounts of pollution produced by the activities due to timber management on the JSYU, the following assumptions were made:

(1) Air pollution from internal combustion engines is uniform over the southwest Oregon air quality control area.

(2) Travel by motor vehicles unrelated to forest management activities accounts for 80 per cent of the emissions occurring in the JSYU.

(3) Activities are uniformly conducted over the course of the year.

The following amounts of pollutants would be produced by timber management practices outlined on the JSYU:

Pollutant	All sources	Timber management related
nitrogen oxides	707 tons/yr	141 tons/yr
sulfur oxides	23.3 tons/yr	4.7 tons/yr
carbon monoxide	2566 tons/yr	513.2 tons/yr
particulates	42.2 tons/yr	2.44 tons/yr

The figures for all sources represent two per cent of the estimated source emissions of the southwest Oregon air quality control area. The figures for timber management related emissions of the JSYU represent 0.4 per cent of the 1975 estimated source category emissions, an insignifiicant amount (figures calculated from DEQ, 1976).

3.1.2.2 Development and Protection Practices

Slash Disposal

Slash disposal as a management practice would involve broadcast burning (burning of all combustible material over the entire subject area), and gross

yarding (cull logs and large slash yarded by cable to landings). Gross yarding would result in impacts discussed previously (and would be part of the activity) of yarding and loading. Broadcast burning would result in impacts to air quality.

In assessing the impacts of slash burning on air quality in the JSYU the following assumptions have been made:

(1) Project design features as stated in Section 1.6.4.2 would be applied; that is, burning would be suspended during periods of high air pollution and air stagnation.

(2) Burning would be conducted only upon concurrence of the Oregon Department of Forestry.

(3) Burning would occur only between October and April.

(4) All other factors contributing to air pollution in the JSYU would be uniformly dispersed over the Southwest Oregon Air Quality Control Area.

(5) Emissions from slash burning would be uniformly distributed over the JSYU.

The amount of slash, debris, and logging residue considered in the analysis would exist on the 10,000 acres proposed to be burned. No slash burning has been done on the JSYU over the past five years to October 1, 1977 (BLM File Data, OSO); therefore, it is assumed that there will be no slash burning until the possible initiation of the proposal. Consequently, the proposed action represents an increase of from none to 10,000 acres of burning over the 10 year time period, or 1,000 acres per year average.

The average volume of logging slash in the Douglas fir-hardwood type has been measured varying from 961 to 6,833 cubic feet per acre on clear cuts and partial cuts (Maxwell, et.al., 1976). In western Oregon, logging slash on BLM-administered and State lands has been measured with volumes averaging 2,677 cubic feet per acre (Howard, 1971). This volume contrasts with 4,511 cubic feet per acre reported on national forests, and 1,507 cubic feet per acre reported from private lands in western Oregon (Ibid.). Another publication lists volumes of from 14,390 to 6,236 cubic feet per acre on national forest lands in western Oregon (Dell, et al., 1971). After considering the type of timber that would be cut, the geographic location, and the age of most of the trees, an average figure of 2,400 cubic feet per acre was used in the analysis. This volume times the number of acres that would be burned equals 24 million cubic feet of slash that would be burned. Dividing this amount by ten years equals two million cubic feet per year, the average volume that would be burned each year.

From reported ratios of debris volume to weight at eight logging sites in western Oregon, an average of 76.1 cubic feet per ton of slash was calculated (Dell, et al., 1971). This figure is equivalent to a density of 26.26 pounds per cubic foot of slash.

This density figure multiplied by the average volume of slash that would be burned equals the weight of the logging residue that would be burned; this amount equals 63 million pounds or 31,500 tons.

Burning is a chemical reaction betwen the air and the slash which releases heat, gases, and particulates. Certain gases and particulates are used as measures of air pollution from slash burning; these are particulates, oxides of nitrogen, carbon monoxide, and hydrocarbons. The amount of each pollutant produced as each ton of logging residue burns multiplied by the weight of the slash that would be produced equals the weight of the pollutants that would be produced (Sanburg, et al., 1976). Table 3-2 illustrates the calculations of the analysis.

The airshed over the JSYU is assumed to be the area enclosed by the boundaries to an altitude of 10,560 feet, or two miles. This space is 2,656 cubic miles.

This amount of pollution that would enter the air equals the total weight of each pollutant produced divided by the volume of air space. This quotient equals the amount of air pollution that would be caused by slash burning, in

Table 3-2

Potential Air Pollution Caused by Slash Burning in the Proposed Action

Amount of Slash that would be burned	Pollutant Produced by burning slash	Weight of Pollutant Produced per ton of Slash Burned (lbs/ton)	Calculated Weight of Pollutant Produced by the Proposal each year (pounds)	Volume of Airshed (cubic miles)	Amount of Pollutant per volume of Air (tons/cubic mile)	Existing level of Pollutant per volume of Air (1975) (tons/cubic mile)	Potential Increase
31,500 tons	particulates	17	536,000 lb	2,656	0.101	1.088	9.3 %
	carbon monoxide	60	1,890,000 lb.	"	0.356	7.598 tons/mi.^{3}	4.7 %
	hydrocarbons (as C)	12	378,000 lbs	"	0.071	No Data	--
	oxides of nitrogen	2	63,000 lb	"	0.012	1.877	0.6 %

tons per cubic mile. This amount compared to the existing background levels equals the increase (expressed in per cent in the analysis) that would be attributable to the slash burning. In Table 3-2, the potential increase in air pollution has been calculated.

The emission of particulates is of concern in this analysis since measured amounts have been high. The potential emission of 0.101 tons per cubic mile of particulates can (for comparison) be converted to micrograms per cubic meter (the standard measure of particulate pollution at air pollution monitoring stations). The 0.101 tons per cubic miles equals 22.0 micrograms per cubic meter of particulates yearly. On a daily basis, the amount would be 0.060 ug/M^3. This compares to the measured average value (at Grants Pass) of 58 ug/M^3 (Table 2-4), a 0.1 per cent potential increase.

The calculated 0.101 tons per cubic mile appears disproportionately large compared to the calculated average amount of micrograms per cubic meter. In fact, these two methods of measurement are inconvertible; they are part of the analysis to explain the two methods of expression. The amounts measured in tons per cubic mile are general qualities; the amounts in micrograms per cubic meter are measured weights of samples extracted from fixed volumes of air at monitoring stations. No relationship exists between measured particulate values (from air quality measuring sites) and yields per ton of particulates from burning fuels (Hall, 1972). Since smoke particles are so small (0.002 to 0.3 microns), they do not settle from the air but remain suspended for days or even months (Fritschen, et.al., 1970). The material found in the air pollution

monitoring sites in the Southwest Oregon Air Quality Maintenance Area is fugitive dust (soil particles) and fly ash from plywood factories (DEQ, 1976).

Since pollution from burning forest vegetation (wild fire and controlled burning) accounts for 23.7 per cent of the particulate pollution and 6.9 per cent of the hydrocarbon pollution produced annually in the United States (Sandberg, et.al., 1975), the burning of slash is rightly of concern. However, the amounts of potential increase in pollutants (Table 3-2) seem large compared to the amount of slash proposed to be burned. The reason lies in the assumption of the analysis that all the fuel on the 10,000 acres would be burned, with the resulting smoke rising into a fixed quantity of air (like a match burning in an inverted bottle). Actually, the mixing of the air by wind would quickly disperse the pollutants produced by the proposed action. Under the assumed management guidelines, no burning would be done on days when there was no atmospheric mixing or movement. The smoke would not fill the airshed, to the extent allowed by the weight of the slash burned, as though it was a closed container. Instead, the smoke would rapidly dissipate, reaching background levels after traveling several miles. The effects of the smoke would be felt in the immediate vicinity of the burned area (within a five-mile radius), with a reduction in visibility within that radius being the impact (Fritschen, et al., 1970). Since all burning would be conducted during periods of dispersive air movement, impacts to air quality would be negligible. Dispersive conditions are usually accompanied by cloudy conditions with low visibility due to fog and localized precipitation; therefore, impacts of slash burning to visibility would be inconsequential.

Herbicides

Herbicide application by aircraft would involve the spraying of mixtures of herbicides, carrier (material in which the herbicide is suspended), and small amounts of other additives (emulsifiers and wetting agents). The specific chemicals involved would be chosen in accord with the project design features outlined in Section 1.6.4.2.

The atmosphere would be used as a dispersive and transmittal medium in aerial application of herbicides. Droplets of herbicide mixture would be of such a planned size so as to drop through the air in a minimum of time to reach the vegetation objective. Some dispersion of the herbicide and carrier wouuld be inevitable. In order to determine the amount of herbicide and carrier that would enter the atmosphere as a contaminant (component of the fluid atmosphere that normally does not occur within that particular locality), the following assumptions have been made:

(1) The rate of dispersal over the target area would be held by good management practices so that only a minor amount would be volatilized to the atmosphere (Johnson, 1976), here estimated to be five per cent of the herbicide and vehicle.

(2) The volatilized component of the spray would disperse uniformly into the atmosphere around the target area.

Based on these assumptions, totals of herbicides and diesel oil carriers are presented in Table 3-3. The summary totals of diesel oil carrier that would be used equal 110,000 to 400,000 gallons. For this analysis it is assumed that five per cent of the diesel oil carrier would be volatilized to the atmosphere, thus becoming a pollutant. Therefore, 5,500 to 20,000 gallons of diesel oil would enter the airshed of the JSYU over ten years. An average amount of 1.51 gallons to 5.48 gallons of diesel oil would enter the airshed of the JSYU each day (on an average basis). This is an insignificant amount.

In estimating the amount of herbicide drift that would enter the atmosphere as a contaminant (atmospheric pollutant), it is very difficult to estimate amounts and rates due to the number of chemicals involved and their individual properties. In this analysis it is assumed that five per cent of each specific herbicide would be volatized as an atmospheric contaminant. Table 3-4 presents the amounts of herbicides that would enter the airshed of the JSYU over the ten-year period of the proposed action, and as an average daily basis. The amounts of herbicides which contaminate the air given in Table 3-4 are estimates of worst case values. Actual amounts would vary with atmospheric conditions during application; the contamination of the air by herbicides is not expected to have significant impacts to the airshed (Gratkowski, 1974).

Table 3-3
Estimated Herbicide Applications for the JSYU over Ten Years

Herbicide	Estimated Acres	Application Total of Diesel Oil Carrier[1]	Application Total of Herbicide
For Release (Applied during the Dormant Season)			
2,4,5-TP (silvex)	9,000	45,000-180,000 gal	2250-6750 lb
2,4-D	9,000	45,000-180,000 gal	2250-6750 lb
Round-up	1,000	NA	250 lb
Krenite	1,000	NA	250 lb
Atrazine	1,000	NA	4000 lb
Dalapon	1,000	NA	3,000-11,000 lb
For Site Preparation (Applied prior to planting)			
2,4,5-TP (silvex)	20,000	10,000-20,000 gal	5,000-15,000 lb
2,4-D	20,000	10,000-20,000 gal	5,000-15,000 lb
Round-up	5,000	NA	15,000 lb
Krenite	5,000	NA	15,000 lb
Atrazine	15,000	NA	45,000-60,000 lb
Dalapon	5,000	NA	15,000-55,000 lb

1 Based on an application rate of 15 gal/acre for release, and 0.5 to 1.0 gal/acre for site preparation as maximum amounts of carrier that would be used.

Table 3-4

Estimated Amounts of Herbicide Applications Entering the Airshed of the JSYU as Contaminants

Herbicide	Total Contamination for Proposal Period	Average Daily Contamination of the Air Over the JSYU
2,4,5-TP* (Silvex)	362.5 to 1087.5 lb	0.099 to 0.298 lb
2,4,-D	362.5 to 1087.5 lb	0.099 to 0.298 lb
Round-up	762.5 lb	0.209 lb
Krenite	762.5 lb	0.209 lb
Atrazine	2,450 to 3,200 lb	0.671 to 0.877 lb
Dalapon	900 to 3,300	0.247 to 0.904 lb

* Note: Silvex contains a contaminant known as "Dioxin" or "TCDD" which is discussed as a separate section in the Water Resources Section of this chapter.

3.1.3 Soils

3.1.3.1 Silvicultural Practices

In this portion of the analysis, only the effects of removing the trees from the forest, as components of the biomass of the ecosystem, are considered. This section should be read in the context of the change in the soil caused by the removal of the trees; the physical means used to remove and transport the trees as logs are considered in subsequent sections of this chapter.

Two-Stage Shelterwood

Removal of trees from a forest environment interrupts the natural cycling of nutrients within the soil. Loss of nutrients from forest soils results after logging has removed all or part of the trees (Sopper, 1975). In one study of partial cutting (in which some trees in the plot were cut and left in place, with no yarding or loading operations, and no road construction) net nitrogen mobilization increased 2.3 times over the undisturbed rate on an average basis over three years (Hornbeck, et.al., 1974 in Sopper, 1975).

Present nitrogen losses from undisturbed forest lands in western Oregon have been measured as 0.16 lbs./acre per year (Fredriksen, 1971 EPA, 1976(a));

this measurement does not consider the impacts on nitrogen from microbiotic activity, precipitation, and particulate settling, especially pollen, smoke particles, and road dust (Fredriksen, 1972 in Franklin, et al., 1972). Since the regeneration cut of the two-stage shelterwood practice is removal of up to 60 per cent of the trees, it is assumed that the same net mobilization of nitrogen observed by Hornbeck, et al. would occur after this practice on the JSYU. Therefore, 15,088 pounds of nitrogen per year for three years (a total of 45,264 lbs.) would be lost from the soil due to the regeneration cut on 41,000 acres.

The loss of phosphorus from western Oregon forest ecosystems has been measured as "about in the same order of magnitude as outflow for nitrogen" (Fredriksen, 1971 in Franklin, et.al., 1972). Therefore, it is assumed that the losses of phosphorus from the soils of the JSYU would be proportional to calculated amounts of nitrogen that would be lost from the areas subjected to regeneration cut. The observed loss from an undisturbed western Oregon forest ecosystem has been 0.0936 lb/acre per year. Therefore, the net outflow would be 2.3 times this total, or 0.215 pounds per acre per year. The length of time that such increases in phosphorus movement would occur is assumed to be three years. Therefore, the net loss of phosphorus from the soils of the areas subjected to regeneration cut would be 8,826 lb. per year, or a total of 26,479 pounds of phosphorus (Ibid.).

Potassium losses were observed as 0.28 lb/acre per year (average over two years) in the same undisturbed ecosystem (Ibid.). After partial cutting a previously undisturbed forest, potassium losses increased by 1.5 times (Hornbeck, et al., 1974 in Sopper, 1975). Therefore, the assumed loss of potassium from the JSYU due to the regeneration cut would be 4.2 lb/acre per year. Assuming the same three-year loss time prior to a return to background levels of nutrient discharge, a total of 172,200 lbs. of potassium would be lost per year from the soils subjected to regeneration cut, or a total of 516,600 pounds of potassium.

Losses of other nutrient cations (positively charged atoms), calcium and magnesium, were observed as 10.54 lb/acre per year (averaged over two years) in the undisturbed forest (Fredricksen, 1971 in Franklin, et al., 1972). Under the same previous assumptions on rates of losses and time, the total loss of calcium and magnesium would be 993,743 lb. per year, or a total of 2,981,228 pounds.

The same procedures of analysis (made under the same set of assumptions) were used to determine impacts to the soils of the final cut (of 9,000 acres) of the two-stage shelterwood cut. Table 3-5 illustrates the total amounts of nutrient losses anticipated to occur on the areas subject to the silvicultural practices.

Table 3-5

Nutrients Mobilized in the Soil Ecosystem as a Result of the Silvicultural Practices*

	Nutrient			
Silvicultural Practice	Nitrogen	Phosphorus	Potassium	Calcium & Magnesium
Two-Stage Shelterwood				
Regeneration cut (41,000 acres)	15,088 lb./yr 45,264 lb Total	8,826 lb./yr 26,479 lb. Total	17,220 lb./yr 51,660 lb. Total	64,821 lb./yr 194,463 lb. Total
Final Cut (9,000 acres)	3,312 lb./yr 9,936 lb. Total	1,938 lb./yr 5,812 lb. Total	3,780 lb./yr 11,340 lb. Total	14,229 lb./yr 42,687 lb. Total
Clearcut (5,000 acres)	71,400 lb. Total	4,749 lb. Total	173 lb. Total	1,389 lb. Total
Commercial Thinning (4,700 acres)	865 lb./yr 2,594 lb. Total	505 lb./yr 1,516 lb. Total	987 lb./yr 2,961 lb. Total	3,715 lb./yr 11,146 lb. Total
Pre-Commercial Thinning (14,200 acres)	No estimation can be made due to lack of research data (EPA 1976(1))			
Sanitation Salvage	As required (Acreage figures subjected to disturbance may release large quantities of nutrients (EPA 1976(2))			
Total	148,459 lb.	49,815 lb.	88,121 lb.	332,450 lb.

* These numbers are calculated values from research results on experimental forests in the western United States. They are presented here to illustrate the effects of removing trees from forest ecosystems. The figures given are qualitative; they should not be accepted as absolute values.

Clearcutting

The 5,000 acres that would be subjected to clearcutting would undergo maximum nutrient mobilization due to vegetation removal (since in the practice, all vegetation is removed from the subject area). Also, clearcut areas would be subjected to broadcast burning, which effectively converts all nutrients in the organic fraction of the soil (surface residue, litter layer, and organic horizon) to soluble form in ash. In this analysis, it is assumed that all areas subjected to clearcutting would be subsequently subjected to broadcast burning as a management practice.

Nitrogen losses would increase from an estimated 0.16 lbs/acre per year to 4.6 lbs/acre per year the first year after cutting and burning. The losses would return to background levels after six years (estimated from results in Fredricksen, 1971; and Brown, et al., 1973 in EPA, 1976(a). Therefore, the total average loss of nitrogen from the lands subjected to clearcutting would be 2.38 lbs/acre per year, or a total of 14.28 lbs/acre of nitrogen lost as a result of clearcutting. Therefore, the total estimated loss of nitrogen would be 71,400 pounds on the 5,000 acres clearcut and burnt as a result of the proposal.

The same order of magnitude of impact to phosphorus loss to the soil ecosystem is assumed for clearcutting as for the two-stage shelterwood system. The total loss of phosphorus from the 5,000 acres clearcut and burned would be

from an undisturbed value of 0.0936 lbs/acre per year to 0.223 lbs/acre per year mobilized. Therefore, the total amount of phosphorus that would be released would be 4,749 pounds. Phosphorus is relatively immobile in soil ecosystems; although the 4,749 pounds of phosphorus would be changed from an organic form to a mineralized form, little would be expected to move from the soil (Brown, et al., 1973 in EPA, 1976(a)).

A smaller amount of potassium would be released by the clearcutting and burning. An estimated 0.03456 lbs/acre of potassium would be lost after logging and burning; this would total 173 pounds of potassium lost due to the practice (DeByle and Packer, 1972 in Sopper, 1975).

Losses of calcium and magnesium would be 0.2778 lbs/acre for the 5,000 acres subjected to clearcutting and burning, a total of 1,389 pounds (Ibid).

The time frames for the length of time the impacts would occur on the 5,000 acres subjected to clearcutting are very difficult to estimate. In this analysis, it is assumed that the impacts to phosphorus would occur over one year, those for potassium, six months; and those for calcium and magnesium, four years.

Commercial Thinning

Very little research has been done on the effects of commercial thinning alone on the soil resource (EPA, 1976(a)). In this analysis it is assumed that the areas subjected to commercial thinning would receive fifty per cent of the impacts to the soil resource as those experienced in two-stage shelterwood harvesting. The total amounts of impacts in terms of nutrients mobilized from the soil ecosystem are summarized in Table 3-5.

Sanitation Salvage

Since sanitation salvage would be done on an "as required" basis, it is impossible to estimate the actual impacts to the soil resource alone. Examples of sanitary salvage would include windthrow harvest, insect infestation (in which trees are cut and burned in place), and salvage after wildfire.

Conclusion

The overall mobilization or nutrient compounds due to the silvicultural practices would result in some loss due to leaching. The expected loss would be in the order of 0.5 per cent for phosphorous, 1.1 per cent of the potassium, 1.5 per cent of the magnesium, and 0.6 per cent of the calcium in the upper twelve inches of the soil (Sopper, 19975). Losses of nitrogen would vary with the type of cutting practice, the amount of organic matter in the soil, and the amount of precipitation on the specific site involved. Leaching

losses of other nutrients besides nitrogen would be insignificant. Nitrogen losses would be of site specific significance; therefore, fertilization would be required (see "Fertilization," this chapter).

3.1.3.2 Yarding and Loading

Tractor Methods

Tractor logging would be done by crawler tractors equipped with tracks, and by rubber-tired skidders. Both types of vehicles would be equipped with a variety of winch and/or hydraulic leverage attachments for efficiency in yarding (moving logs from their resting place after cutting to the place where they are loaded on trucks).

Both types of vehicles would move about within the forest, skidding (moving the logs by hoisting or dragging) logs to loading areas. With repeated passage of tractors and skidders, trails would naturally be created since the vehicles would continuously use the path of least resistance within the yarding area.

The impacts to the soils would occur on the skid trails as repeated passage by the logs and heavy equipment disturbed and compacted the surface layers of soil. Disturbed soil, in which the organic layer has been removed or mixed with the underlying mineral fraction, would be subject to increased

erosion. The repeated passage of logs and equipment would compact the soil, reducing the infiltration rate.

The total area of the JSYU that would be subjected to disturbance and compaction by tractor methods would be 15,669 acres (Table 3-6). Assuming this area is presently in an undisturbed state, the present amount of erosion that is occurring from these lands is 1,101.73 tons per year (based on the previously defined rate of 45 tons per square mile per year). The anticipated amount of erosion that would occur on the 15,669 acres would equal 1762.76 tons per year (Megahan, 1972 in EPA, 1976(b)), with a variability of plus or minus 50 per cent (Ibid). This erosion rate would continue at a decreasing rate for an estimated four years. The total soil that would erode (from place of origin to an unknown point of deposition) would be 4406.92 tons, based on a declining rate of 25 per cent per year. After the four years, the erosion rate would equal that estimated as an average for undisturbed lands on the JSYU.

Cable Methods

Cable logging, in which logs are either dragged or suspended to yarding areas, would disturb 3968 acres (Table 3-6). Since cable logging does not require the repeated passage of heavy equipment over trails (as in tractor yarding), surface disturbance and compaction would be less by a factor of over 50 per cent (Rice, et al., 1972 in EPA, 1973). Therefore, the amount of erosion that would occur on the 3968 acres subjected to cable yarding would

Table 3-6

Soil Disturbance and Soil Compaction Attributable to Yarding and Loading --Worst Case Analysis

Cutting	Acres	Soil Disturbance Factor	Total Acres of Soil Disturbance	Soil Compaction Factor	Total Acres of Soil Compaction
Tractor Systems					
Shelterwood (high intensity lands)	34,650	36 %	12,474	26 %	9009
Shelterwood (Low intensity lands)	3,850	36 %	1,386	26 %	1001
Clearcut	3,850	36 %	1,386	26 %	1001
Commercial Thinning	4,230	10 %	423	5 %	211
Subtotal	46,580		15,669		11,222
Cable Systems					
Shelterwood (High intensity land)	10,350	31 %	3,209	9 %	932
Shelterwood (Low intensity lands)	1,150	31 %	356	9 %	103
Clearcut	1,150	31 %	356	9 %	103
Commercial Thinning	470	10 %	47	5 %	24
Subtotal	13,120		3,968		1,162
Total Yarding and Loading	59,700		19,637		12,384

be 446.4 tons per year for an estimated four years, declining at the same 25 per cent per year. The total after four years would be 1116 tons of soil. Thereafter, the erosion would return to background levels.

Conclusion

The erosion that would result from the yarding and loading practices would be a measure of that estimated amount of soil that would move from its place of origin to some other place of deposition (other than a stream channel). Such erosion is termed sheer erosion. There would be site specific impacts of varying degrees of significance to the site involved. Overall, the impact would be of very minor significance over the whole of the JSYU.

3.1.3.3 Transportation System

New Road Construction

In the proposed action, 500 miles of permanent road would be constructed on 4,340 acres of previously undisturbed lands. The impacts of road construction in the forests of western Oregon has been the object of many studies. Forest roads have been recognized as a major factor contributing to erosion in the western Cascade Mountains of Oregon (Fredriksen, 1970). Logging roads have been identified as the major cause of erosion resulting from silvicultural activities (EPA, 1975). Logging roads are the main factor in soil movement and stream siltation (BLM, 1959).

In the Douglas-fir region, only a third of the area of a typical road is occupied by the road bed; cut and fill slopes account for the remainder (Dunford, 1962 in Anderson, et al., 1976). For every mile of road built, eight acres of cutbanks, fills, and ditches are required (Usher, 1961 in Anderson, 1976). Therefore, the 4,340 acres of permanent road that would be constructed would be approximately equal to the 4,000 acres anticipated by previous research.

The previously estimated erosion rate for the undisturbed lands on the JSYU is 45 tons per square mile per year; this is approximately equal to 0.07 tons per acre per year. The increase in erosion due to logging roads would be 220 times this figure, or 15.4 tons per acre per year. Therefore, the total amount of erosion that would occur due to new road construction would equal approximately 67,000 tons per year, decreasing at a rate of 25 per cent per year for four years to background levels. The total erosion due to new road construction would equal approximately 167,500 tons over four years (calculated from Megahan, 1972 in EPA, 1976(b)).

Reconstruction and Maintenance

The number of miles of road requiring reconstruction and renovation in the JSYU is variable from year to year (see Section 2.1.4.4). Factors such as the degree and intensity of use, extreme weather events, and normal wear determine the need for reconstruction. Maintenance (the blading and otherwise keeping of the road surface in a usable condition) occurs constantly; however,

it is directed on an intensity of use basis to areas of greatest need (which cannot be anticipated by this level of analysis). It is very difficult to estimate the amount of erosion that would occur due to reconstruction and maintenance. Over the ten year period of the proposed action, an estimated 7,500 tons of soil would be eroded due to reconstruction and maintenance.

The total erosion due to road construction, reconstruction, and maintenance would equal approximately 175,000 tons (by calculation and estimation).

3.1.3.4 Development and Protection Practices

Slash Disposal

The residue left from logging operations has been previously calculated for the analysis of impacts of slash burning on air quality. In this analysis, it is assumed that the volume and mass of slash calculated for the analysis of impacts to air quality from broadcast burning holds true not only for the 10,000 acres that would be broadcast burned, but also for the 33,500 acres that would be gross yarded.

Therefore, 2,400 cubic feet per acre of slash would be gross yarded on 33,500 acres of harvested lands. This would amount to 80,400,000 cubic feet of cull material, slash, and other debris that would be stacked and piled on cut-over lands over the ten years of the proposed action. It is assumed

that most of this material would be hauled away by firewood cutters, as the yarded material would be immediately adjacent to logging roads. It is possible that some small amount of material would be burned; this is impossible to quantify.

Scarification

Scarification would occur on 160 acres under the proposed action. The practice of scarification is assumed in this analysis to be equivalent to soil preparation for planting of row crops in forest lands. The erosion rate for undisturbed lands has previously been defined as 0.0703 tons per acre per year. The disturbance due to scarification would increase this rate by 100 to 1000 times. Therefore, erosion on the 160 acres subjected to scarification would equal 1,125 to 11,250 tons per year, decreasing at a rate of 25 per cent per year over four years reaching backround levels. The total amount of erosion that would occur over the four years would equal 2,812 tons to 28,125 tons, in the worst case (calculated from Brown, 1960 in EPA, 1976(b)). This would have significance to the site involved; it would be insignificant in relationship to the entire JSYU.

Herbicide Application

Herbicides would be applied in the JSYU for preparation of sites for planting new seedlings and for release of young trees from competing vegetation. Different densities of vegetation would be sprayed under the two techniques;

therefore, different proportions of the forest floor would be exposed to the herbicide sprays.

The application of herbicides would often be in combinations, in sequence, or otherwide multiple times over the areas sprayed; therefore, the number of acres that would be subjected to the spraying is greater than the total number of acres treated. Table 3-7 illustrates the applications of the herbicides that would be used on the JSYU, estimated percentages of the herbicides and diesel oil carrier that would enter the soil of the treated areas.

The amount of herbicide and diesel oil carrier that would enter the soil would be decomposed over a few weeks time by soil microbes. The amounts involved would not cause permanent harm to the soils involved. Therefore, the impacts are not significant.

Fertilization

The forest ecosystem contains a capital of nutrients in the flora and fauna, the dead and decaying organic matter, and the soil. Through a very complex process in energy transfer, nutrients are recycled within the forest. This transfer of nutrients within the forest ecosystem is a closed cycle; breakage of the cycle at any point results in a loss of nutrients (Bollen, 1974). Nitrogen is the nutrient most susceptible to removal from the forest ecosystem due to its complex interrelationship with soil microbiotic life

Table 3-7

Estimated Herbicide Amounts Entering the Soils of the JSYU

Herbicide	Acres	Total Application of[1] Herbicide and Carrier	Estimated Per Cent Reaching Soil[2]	Total of Herbicide and Carrier in Soil[1]
Release				
(Silvex) 2,4,5-TP	9,000	2250 - 6750 lb 45,000 - 180,000 gal	18	405 - 1,215 lb 8100 - 32,400 gal
2,4-D	9,000	2250 - 6750 lb 45,000 - 18,000 gal	22	495 - 1485 lb 9900 - 39,600 gal
Round-up	1,000	250 lb	12	30 lb.
Krenite	1,000	250 lb	14	35 lb.
Atrazine	1,000	4,000 lb	40	1,600 lb.
Dalapon	1,000	3,000-11,000 lb	38	1140 - 4180 lb
Site Preparation				
(Silvex) 2,4,5-TP	20,000	5,000 - 15,000 lb 10,000-20,000 gal	26	1,300 - 3,900 lb 2,600 - 5,200 gal
2,4-D	20,000	5,000 - 15,000 lb 10,000 - 20,000 gal	31	1,550 - 4,650 lb 3,100 - 6,200 gal.
Round-up	5,000	15,000 lb	17	2,550 lb
Krenite	5,000	15,000 lb	20	3,000 lb
Atrazine	15,000	45,000 - 60,000 lb	46	20,700 - 27,600 lb
Dalapon	5,000	15,000 - 55,000 lb	43	6,450 - 23,650 lb

1 The top figure refers to the total amount of herbicide in pounds. The lower figure refers to the diesel oil carrier in gallons; if no carrier is listed, the herbicide is applied in a water emulsion.

2 These estimates are an approximation only; the actual amounts of herbicides entering the soil depend on "The magnitude of the dose and the duration of exposure to microorganisms, the amount of chemical available for uptake by plants, and the potential for movement of herbicide residues into water" (Norris, 1971).

(Moore, et al., 1974). It is also the nutrient most likely to be limiting maximum growth in the forest (ibid.).

The proposed action would apply 150 to 300 pounds per acre of urea fertilizer pellets (46 per cent nitrogen) on 22,300 acres, for a total of 1,672 to 3,345 tons over ten years.

The effects of increased nitrogen in the forest ecosystem would be localized increases in pH (soils become less acid), an increase in the rate of decomposition, and an increase in the solubility of organic matter. Little is known about the effect of nitrogen on the recycling rates of other nutrients in forest soils. The impact of an increase in the nitrogen content of the forest soil would be to increase the rate of growth of all plants in the ecosystem, including weeds, brush, microbes, and trees (Moore, et al., 1974). This impact would be of minor significance.

<u>Planting</u>

The impacts of the three planting systems on the soil would be so similar they are considered here as one action.

Reforestation of burned, nonstocked, and poorly stocked areas would reduce long-term erosion losses and improve water infiltration capabilities in areas with poor vegetational cover (USFS, 1977). The loss of soil by erosion would decrease in direct proportion to the increase in canopy cover

by growing trees. Raindrops would be intercepted by the thicker canopy cover of the growing trees, resulting in decreased spatter erosion and compaction of the surface by raindrops. Raindrops can compact bare soil by the kinetic energy of falling, resulting in a surface layer that reduces infiltration and increases overland flow (Lull, 1959).

The planting of tree seedlings would increase soil moisture retention through the dry season (June through September); this retention would attenuate the movement of soil particles downslope by dry ravelling (movement of soil particles by gravity). The increase in root penetration would increase the stability of soils on steep slopes. Tree roots help to maintain the stability of soil, lessening mass movement (Burroughs, et al., 1976).

Planting the seedlings would decrease the mortality due to frost and dessication that is normally expected in germinating seeds on bare soil by natural regeneration. As the trees grow, frost and wind exposure of the soil surface would be lessened. Soil temperature extremes would be attenuated by the growing trees. The growing seedlings would create their own favorable environment.

The rate of regeneration would be accelerated by the planted seedlings. The increased rate of regrowth would decrease the amount of soil that would move downslope by erosion. Infiltration would increase and overland flow would decrease on the planted areas (Anderson, et al., 1976).

3.1.4 Water Resources

3.1.4.1 Silvicultural Practices

In the analysis of impacts to water resources due to the silvicultural practices, only the effects of removing the trees from the forest ecosystem have been examined. Subsequent sections consider the impacts of the other management practices, in order. The impacts of all components of the proposed action would be cumulative. A summary of the cummulative totals for the impacts is provided at the end of the water resources section.

Shelterwood Harvest

A total of 41,000 acres would be involved in the initial regeneration cut of the proposed action. Another 9,000 acres would receive the final harvest cut of the proposal. The impacts to water yield would be the same for both practices. An increase in water yield of about 25 per cent would be anticipated for the lands receiving the shelterwood harvest (see Figure 3-1, and Table 3-8 and 3-9) (Harr, et.al., 1976).

The average yield for all lands in the JSYU was 1.936 acre ft./ year/acre for the Rogue River Watershed, and 2.009 acres ft./ year/acre for the South Umpqua River Watershed (Cow Creek) in 1975 (the standard average water year for this analysis) (calculated from USGS, 1976). For this analysis, the average yield has been considered to be 2.00 acre ft./year/acre for the whole of the JSYU.

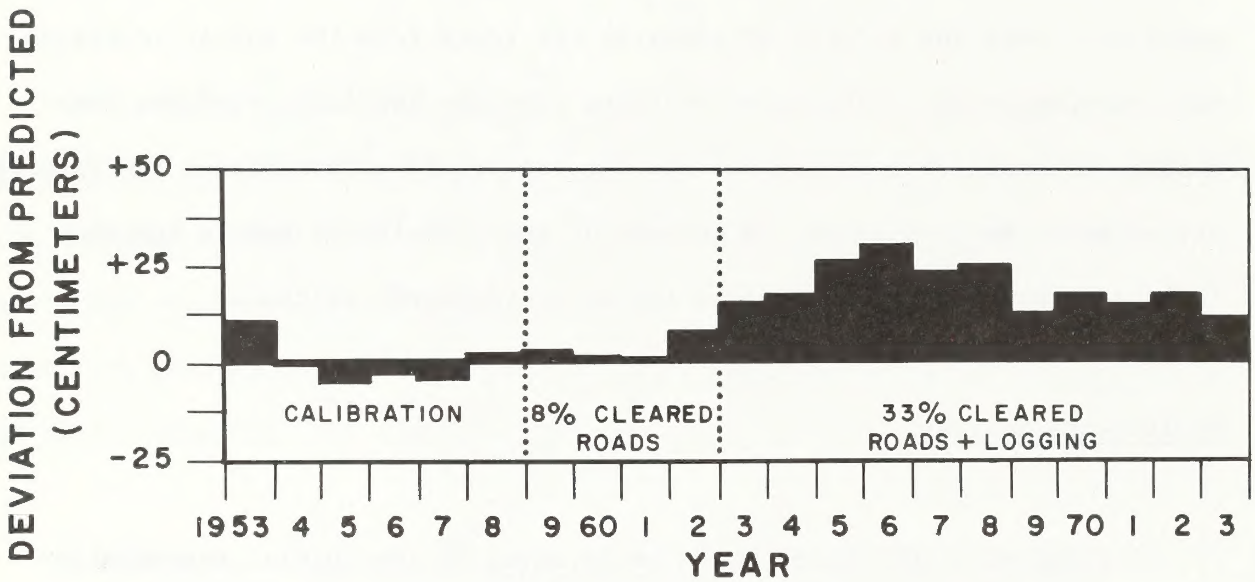


Figure 3-1 INCREASE IN ANNUAL YIELD AFTER ROAD-BUILDING & PATCH CUT LOGGING
SOURCE: Harr, 1976

Table 3-8
Summary of Increases in Annual Water Yield in Western Oregon

Watershed	Code	Size	Cut	Treatment[1]	Yield Increase		
					Maximum	Avg.	Average Increase
		Acres	Percent		cm	cm	Percent
Alsea (needle Branch)	AL-1	175	82	CC-R	62	49	27
Alsea (Deer Creek)	AL-3	749	25	PC-R	15	7	5
H.J. Andrews	HJA-1	237	100	CC	56	38	34
H.J. Andrews	HJA-3	250	33	PC-R	27	18	17
Fox Creek	FC-1	146		PC	--	2/	--
Fox Creek	FC-3	175	75	PC	--	2/	--
Coyote Creek	CC-1	170	30	SW-R	--	2/	--
Coyote Creek	CC-2	168	30	PC-R	9	2/ 8	24
Coyote Creek	CC-3	124	100	CC	37	33	70

1/ CC = clearcut, R = roads, PC = patch cut, SW = shelterwood.
2/ No significant change.

(Harr, 1976)

Table 3-9

Summary of Increases in Annual Yield, Average Peak Flow, and Large Peak Flows in Experimental Watersheds in Western Oregon

Location and Watershed	Code	Area	Cut	Severely Compacted[1/]	Did increase occur? Annual Yield[2/]	Average Peak Flow[2/]	Large Peak Flow
		Acres	Percent	Percent			
Alsea (Needle Branch)	AL-1	175	82	5	Yes	Yes	No
Alsea (Deer Creek)	AL-3	749	25	4	Yes	No	No
Alsea (Deer Creek #2)[3/]	AL-32	138	30	3	Yes[4/]	No	No
Alsea (Deer Creek #3)[3/]	AL-33	99	65	12	Yes[4/]	Yes	Yes
Alsea (Deer Creek #4)[3/]	AL-34	40	90	0	Yes[4/]	Yes	No
H.J. Andrews	HJA-1	237	100	0	Yes	Yes	No
H.J. Andrews	HJA-3	250	30	8	Yes	Yes	No
Fox Creek	FC-1	146	25	2	No	Yes	No
Fox Creek	FC-3	175	25	0	No	No	No
Coyote Creek	CC-1	170	30	15	No	Yes	Yes
Coyote Creek	CC-2	168	30	7	Yes	No	No
Coyote Creek	CC-3	124	100	13	Yes	Yes	Yes

1/ Figures here are not directly comparable. Some are for roads and skid trails only; others also include cut-banks and fill-slopes.

2/ Statistically significant increases (a-0.05) in annual yield and average peak flows are indicated.

3/ The Deer Creek watershed was divided into subwatersheds.

4/ Annual yield data are not available, but increases are assumed, based on results of water yield analyses on other Alsea watersheds.

(Harr, 1976)

The total of 50,000 acres that would receive the shelterwood harvest would yield 2.50 acre ft./year/acre. Therefore, the anticipated increase in water yield on these lands would be 25,000 acre ft./year in an average year. This amount would decrease at a rate of 20 per cent per year reaching background levels after five years. The total yield for the lands impacted by shelterwood harvest would equal 70,000 acre feet. This would equal 0.3 per cent of the average yield of the Rogue River watershed over the same time period, by comparison.

The quality of the water yield from the lands receiving the shelterwood harvest would be impacted by the release of nutrients in the soil ecosystem. (see "Soils", this chapter). The most mobile of the nutrients in the soil ecosystem that would be impacted by the proposal would be nitrogen. An estimated 0.75 pound per acre of nitrogen would enter the streams of the JSYU over a four year period after each harvest action was completed. Over the ten year period of the proposal, the total nitrogen entering the runoff water of the JSYU would be estimated as 37,500 pounds. The average concentration of total nitrogen in the runoff from the JSYU is assumed to be equal to the average of the Rogue River at Agness, Oregon in water year 1975, or 0.79 parts per million (milligrams per liter). The average concentration of nitrogen in the runoff of the JSYU would be increased by an estimated .0000003 per cent of the 1975 average concentration (in an average water year); this would not be a significant amount (See table 3-10).

Table 3-10

Suspended Sediment Concentration Equaled or Exceeded During Years of Maximum and of Minimum Storm Activity Under Three Treatments[1/] (In parts per million).

Treatment	Mean Suspended Sediment for 6 years	Suspended sediment concentration exceeded during					
		Years of maximum storms			Years of minimum storms		
		No. of days per year			No. of days per year		
		1	10	100	1	10	100
Undisturbed	9	220	13	2	14	3	2/
100% clearcut & slash burn	48	1,000	120	3	14	3	1
25% clearcut & slash burn with roads	430	10,000[3/]	600	13	70	17	3

1/ Unpublished data from H. J. Andrews Experimental Forest, Blue River, Oregon R. L. Fredriksen.

2/ Less than the indicated value.

3/ Greater than the indicated value.

Fredriksen, 1972

The other elements of concern (phosphorus, potassium, calcium and magnesium) would not be increased in the total runoff from the JSYU to any significant extent. This total four year loss from lands subjected to shelterwood harvest would equal approximately 0.5 per cent of the phosphorus, 1.1 per cent of the potassium, 1.5 per cent of the magnesium, 0.6 per cent of the calcium in the upper twelve per cent of the soil profile; these losses would be due to the leaching of the mineralized elements in the soil to the runoff water (remembering that most of the runoff in the JSYU is due to soil water released directly to streams) (De Byce and Packer, 1972 in Sopper, 1975).

Clearcutting

A total of 5,000 acres would be clearcut in the proposed action. An increase in water yield of about 40 per cent would be anticipated for the lands subjected to clearcutting (see figure 3-1 and table 3-8 and 3-9) (Harr, et.al., 1976).

The average yield for the lands being clearcut would be estimated as 3.00 acre feet per acre per year. The clearcut areas would be in the high altitude areas of the JSYU which receive over 80 inches of precipitation average each year. The yield per acre for the clearcut areas would, therefore, be 4.2 acre feet per acre per year, estimated. The increase in water yield for the total of the 5,000 acres would be 6,000 acre feet in an average year. This would decrease at a rate of 20 per cent per year for five years. The total increase in yield would equal 18,000 acre ft. for clearcutting.

This amount is equal 18,000 acre ft. for clearcutting. This amount is equal to 0.07 per cent of the discharge of the Rogue River during the same time period, by comparison (assuming 5 average years).

The leaching of other elements of concern would be the same as for shelterwood harvesting; no significant quantity of other elements would enter the runoff waters of the JSYU as a result of clearcutting.

The release of nutrients from the soils of the lands having been clearcut would impact the quality of the runoff water. Nitrogen would be the element of concern due to its mobility and propensity to cause eutrophication of water bodies. This average concentration of the streams draining the JSYU of 0.79 ports per million (milligrams per liter) would be increased. The estimated loss over four years would equal 0.75 pound per acre of nitrogen; this would be equal to 3,750 pounds of nitrogen, total. The increase in concentration of the streams of the JSYU would be an estimated .0000003 per cent of the 1975 average concentration; this would not be a significant amount.

Commercial Thinning

A total of 4,700 acres would be subjected to commercial thinning in the proposed action. The impacts due to commercial thinning would yield an increase of 1,175 acre feet per year in an average year. This would decrease at an average rate of 20 per cent per year for five years; the total yield

would equal an estimated 3,525 acre ft. This would equal 0.014 per cent of the discharge of the Rogue River in water year 1975, by comparison.

The increase in nitrogen to the streams of the Josephine due to the commercial thinning activities of the proposal would be 0.00000001 per cent, above the average value of 0.79 parts per million. This would not be a significant amount.

Slash Disposal

Since the impacts of the slash disposal would occur subsequent to yarding and loading practices, the analysis for water resources follows the analysis for the transportation system, which follows.

3.1.4.2 Transportation Systems

In this section and the one following (Yarding and Loading Practices) the impacts to water quality of sediment yield are discussed. The effects of water acting on soil are so important in understanding the impacts of timber harvesting, a short description of the process is given here.

Water, in the form of precipitation, acting on a soil mass in a disturbed forest ecosystem causes mass movement in the forms of landslides, debris avalanches, and channel scouring. The resting places for the mass movement of

soil is usually a stream channel. Mass movement is considered different from soil erosion, since it is initated by water and results in impacts to water long after its localized effects have been abated. The movement of a mass of soil to a stream channel of itself is a major event; however, it also contributes to sediment yield over many years time after the event.

Sediment moves in a stream channel in response to the force of water in the stream. The ability to move sediment varies with the velocity and quantity of flow. The sediment is deposited on the margins of the stream channel at the high water mark of each year's most severe storm event (causing the greatest amount of discharge). Therefore, not only does a severe storm cause additional mass movement of soil; it also moves the cumulative mass of sediment contained in terraces and bars in the stream channel. Sediment yield, therefore, is a measure of the total amount of soil and rock debris moved by water to and in stream channels (see Figure 3-2).

Road Construction and Maintenance

As part of the proposed action, 500 miles of permanent road would be constructed, 100 miles of existing road would be reconstructed, and 50 miles of existing road would be paved. The 500 miles of new road would occupy 3,940 acres of previously undisturbed lands. The 100 miles of road that would be reconstructed has been assumed in this analysis to have been in a condition approximately half way between the essentially total disturbance of the paved road surface and the undisturbed condition. Paving the surface of the 50

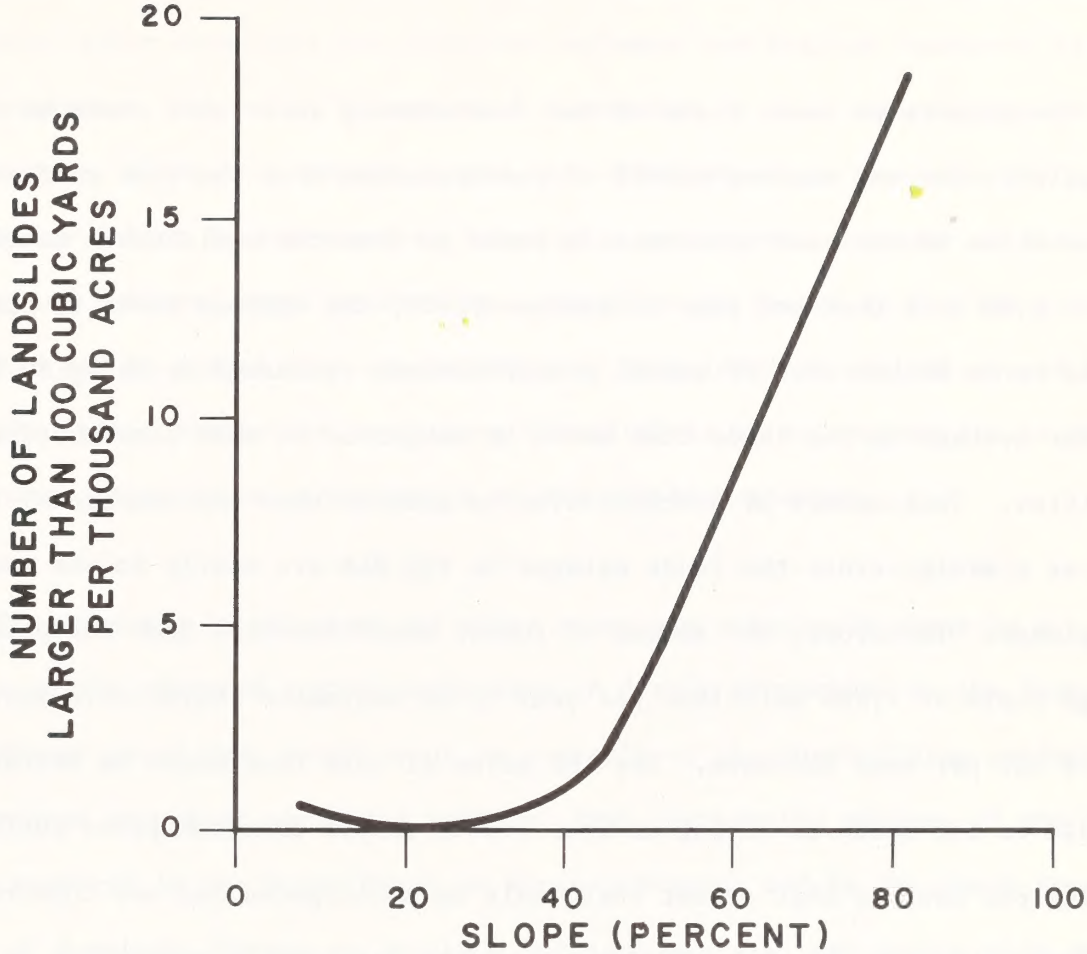


Figure 3-2 RELATIONSHIP OF SLOPE TO LANDSLIDE OCCURANCE

SOURCE: Fredriksen, 1972

miles of road would seal the previously compacted, but still partially permeable surfaces.

The impacts to water yield of the roadbuilding activities would be minimum infiltration and maximum runoff of precipitation from the road surfaces. The 500 miles of new road construction would go from the undisturbed runoff rate of 2.00 acre feet per year to maximum yield; the maximum yield is here assumed to be 80 per cent of annual precipitation, estimated as being 60 inches per year average on the lands that would be subjected to road construction activities. This amount of precipitation is greater than the average of the JSYU, as a whole, since the lands managed by the BLM are mostly in the mountainous uplands. Therefore, the amount of runoff would increase from the present average yield of 7,880 acre feet per year to an estimated 15,760 acre feet per year, a 100 per cent increase. The 100 miles of road that would be reconstructed would be estimated as having an increase in runoff from the paved surfaces of fifty per cent of that amount that would be anticipated for new construction. Therefore, the increase in runoff that would be received in streamflow as annual yield would be estimated as being 788 acre feet per year. The 50 miles of road that would be paved would have an increase in runoff of twenty per cent of present runoff, here estimated as presently 36 inches per year (or 3.00 acre feet per year). Therefore, the increase in annual yield of the streams would be 236 acre feet per year due to paving activities. The total increase in annual yield due to road building activities of the proposed transportation system would be 16,784 acre feet per year, both in the short term and in the long term (since the roads would be permanent).

The impacts to water quality would occur as an increase in several constituents and some properties. The constituents that would increase would be nitrogen, other chemicals and suspended sediment and bedload (sediment yield). The properties that would increase (of importance to this analysis) would be temperature, biological oxygen demand, and chemical oxygen demand. The properties cannot be expressed in terms of a measureable increase at the Agness and Roseburg sampling stations; the dilution factor is far too great. All that can be stated with any accuracy at this level of analysis would be that the stated properties would vary (roughly) in direct proportion to the percentage increase in constituents at the sampling station.

The increase in nitrogen and other chemicals that would occur as a result of the proposed action would vary in direct proportion to the increase in sediment yield that would occur as a result of the roadbuilding activities. The present amount of suspended sediment that reaches the streams of the JSYU -- as measured in the Rogue River at Agness, Oregon; and in the South Umpqua River at Roseburg, Oregon -- equals 3,057 tons per year per square mile and 4,966 tons per year per square mile respectively. In this analysis, it is assumed that the suspended sediment for the JSYU equals 3,500 tons per year per square mile. This equals 5.47 tons per year per acre in the JSYU in the 1975 average water year. The 3,500 tons per square mile per year is estimated to equal roughly one third of the sediment yield (suspended sediment plus the bedload, that total amount of solid matter transported by a stream in an average year). Therefore, the sediment yield for the JSYU is estimated as being 10,000 tons per square mile per year; this includes all lands (including

urban, industrial, agricultural, and residental lands) within the border of the JSYU. The lands that would be disturbed by the construction of 500 miles of new road presently have sediment yield rates of an estimated 150 tons per square mile per year; this is an estimate based on other observations in western Oregon (Fredriksen, 1970). The roads that would be reconstructed have sediment yields (from cuts, fills, and surfaces) of an estimated 5,000 tons per square mile in an average year. The roads that would be paved have present sediment yields of an estimated 20,000 tons per square mile in an average year.

The total annual sediment yield for the roads that would be subjected to the proposed action equals the rate of yield per unit area times the area involved. Therefore, the total sediment yield would equal the following amount:

500 miles new road	$\dfrac{3{,}940 \text{ acres} \times 150 \text{ tons/mi.}^2}{640 \text{ acre/mi.}^2} =$	923 tons
100 miles reconstruction	$\dfrac{788 \text{ acres} \times 5{,}000 \text{ tons/mi.}^2}{640 \text{ acres/mi.}^2} =$	6,156 tons
50 miles paved	$\dfrac{394 \text{ acres} \times 20{,}000 \text{ tons/mi.}^2}{640 \text{ acres/mi.}^2} =$	12,312 tons

The impacts of the proposed action, of the road construction activities, resulting in sediment yield to the streams of the JSYU would occur as a result of initial disturbance plus long term residual impacts. The initial sediment yield of the lands subject to the 500 miles of new construction would equal an

estimated 65,000 tons/mi.^{2} / yr. average. This would decrease at an average rate of 20 per cent per year, reaching the background estimate (the same as for roads that would be reconstructed, or 5,000 tons/mi.^{2}/yr.) after five years. The total sediment yield would equal 195,000 tons/mi.^{2} over this five year period. The same rate of sediment yield would occur after the five years of the construction phase; therefore the long term impacts would begin five years after the initial construction and reach complete background levels after ten years (or approximately the year 1995). The total for this period for the new construction would be 200,078 tons, or 32,500 tons/mi.^{2} The total of both the short term impacts and the long term impacts would equal 227,500 tons/mi.^{2}, or 1,400,547 tons of total sediment. The total that would occur on the lands left in an undisturbed condition would equal 923 tons of sediment over ten years. The total sediment yield of the JSYU (assuming 10 average water years and no change in rate) for the ten-year period would equal 13,388,188 tons without the road construction; therefore, the total sediment yield would increase by an average of ten per cent for new road construction alone.

The reconstruction of 100 miles of existing road would result in an increase in sediment yield of approximately half that anticipated for new road construction (primarily due to disturbances to cut and fill slopes and stream channels). The total sediment yield of the initial disturbance after the first year of the reconstruction would equal an estimated 33,000 tons/mi.^{2}/yr. on the disturbed lands. This would decrease at an average rate of 20 per cent per year over five years time (it is assumed that the total of impacts for

road construction activities would begin during the first year of the ten year plan and end five years after the end of the period, in 1995). Therefore, the total sediment yield for the reconstruction would equal an estimated 121,893 tons. This amount would be approximately three times the amount that would occur if the roads were not reconstructed.

The paving of 50 miles of presently unpaved road would decrease the sediment yield from the surfaces. It is assumed that the present sediment yield from the unpaved roads equals approximately 100,000 tons/mi.^{2}/yr. Paving the surface of 50 miles of road would decrease the sediment yield from these roads to an initial 65,000 tons/mi.^{2}/yr, decreasing by 20 per cent per year to background levels after five years. The total sediment yield from the 50 miles of road surface without the paving of the proposal would equal an estimated 1,000,000 tons/mi.^{2} or 615,625 tons. The total sediment yield from the 50 miles of road after paving would be an estimated 120,046 tons. This would be 495,579 tons less than the roads without paving, or 19 per cent of the sediment yield without the paving of the proposed action.

The total sediment yield due to the transportation system portion of the proposal would equal an estimated 1,642,486 tons. The present amount of sediment yield on the JSYU occurring is a result of road construction is estimated as 2,266,630 tons for the period 1970 to 1980. This amount is considered to be 1.7 per cent of the total sediment yield of the JSYU. The total sediment yield or the JSYU would decrease by five per cent from the existing

level, since the proposed action represents a decrease in the allowable cut (that would mean fewer roads that would be constructed).

3.1.4.3 Yarding and Loading Practices

<u>Tractor Systems</u>

In table 3-6, the amount of soil disturbance and compaction due to the yarding and loading practices have been illustrated. In this analysis it is assumed that the disturbed areas would yield an average of 1.6 times as much sediment as undisturbed sites. It is assumed that disturbed sites would yield ten per cent more water than undisturbed lands; also, compacted soil would yield the same ten per cent more water than undisturbed soil.

The annual yield of the areas prior to tractor yarding would be the 2.50 acre feet per year per acre determined in the previous impact analysis of the silvicultural practices. An increase of ten per cent to this rate would equal 2.75 acre feet per year per acre. Therefore, the annual yield due to disturbance and compaction of tractor yarding would equal 0.25 acre feet per year per acre. The total acres of soil disturbed and compacted would equal 26,891 acres (Table 3-6). Therefore, the increase in annual yield would equal 6,722 acre feet per year decreasing at a rate of 20 per cent per year over five years. The increase in total yield due to tractor yarding would equal 20,168 acre feet.

The sediment yield of the areas subjected to surface disturbance by tractor logging would equal 10,000 tons per square mile per year as an estimate; this is equal to 25 tons/acre/year. If this seems to be a high amount, it should be remembered that the measure of sediment is cumulative; that mass movement contributes to sedimentation over a long time period. The total acres of surface disturbance due to tractor yarding would equal 15,669 acres. Therefore, the total sediment yield for the sites disturbed by tractor logging would equal 391,725 tons per year decreasing at a rate of 20 per cent per year over five years. The total sediment yield due to tractor yarding would be estimated as 1,175,175 tons. This would be approximately 1.7 per cent of the total average sediment yield for all sources of the JSYU over the five year time period.

Cable Systems

The impacts to water quality and quantity would vary with the amount of disturbance and compaction in acres. Cable systems would disturb a total of 19,637 acres and compact an additional 12,384 acres, for a total of 32,021 acres. The previously defined increase in annual yield of 0.25 acre feet per year per acre would result in an increase in annual yield of 8,005 acre feet per year decreasing to background levels after five years at a rate of 20 per cent per year. The total increase in annual yield of the cable systems of the proposed action would equal 24,015 acre feet.

The sediment yield of the areas subjected to cable yarding would be the result of the 19,637 acres of surface disturbance that would result. The sediment yield would equal 25 tons/acre/year on the disturbed lands. Therefore, the total sediment yield that would occur is estimated to the 490,925 tons per year, decreasing to background levels after five years. The total sediment yield for the cable systems of the proposed action would equal 1,472,775 tons, as an estimate. This would be approximately 0.22 per cent of the total average sediment yield for all sources of the JSYU over the five year time period.

Slash Disposal

Slash disposal would involve broadcast burning (in which over seventy per cent of the surface would be burned) on 10,000 acres, and gross yarding (in which cull material and debris would be yarded to sites adjacent to roads, or machine piled) on 30,000 acres.

The impacts of slash disposal would occur after the yarding and loading practices had occurred. Slash disposal would cause an estimated ten per cent additional disturbance and compaction on the areas involved.

Annual yield would increase by an estimated 0.025 acre feet per year on the additional area subject to surface disturbance and compaction due solely to the operations involved in slash disposal. An estimated 30 per cent of the area subjected to slash disposal would be so affected; therefore, the amount of land that would be subject to the increase in the annual yield would equal

12,000 acres. The amount of increase in annual yield would equal 300 acre feet per year, decreasing at a rate of 20 per cent per year for five years. The increase in total yield would be estimated as 900 acre feet for the slash disposal component of the proposed action.

The sediment yield of the areas subjected to slash disposal would increase by an average 2.5 tons/acre/year in addition to that which would occur on the lands after the yarding and loading alone had occurred. The areas subject to disturance and compaction would be 30 per cent of the impacted area; or, 12,000 acres. Therefore, an estimated 30,000 tons of sediment per year would move from the areas subjected to slash disposal, decreasing at a rate of 20 per cent per year for five years. The total sediment yield for slash disposal would be an estimated 90,000 tons.

3.1.4.4 Development Practices

Mechanical Scarification

Mechanical treatment of the brush (crushing and mixing with soil) would result in an impact on the total quantity of runoff with time from the 160 acres involved. Previously, the increase in annual yield clearcutting was considered to be 20 per cent of the observed amount from undisturbed sites. The impact of scarification would be to increase this total amount of runoff by an additional five per cent.

The average annual yield has been assumed to be 2.0 acre feet per year per acre (24 inches). The total annual yield from the 160 acres after harvesting would be 2.4 acre feet per year per acre, or 28.8 inches. The additional five per cent (equal to 1.0 inches additional annual yield) would equal 2.483 acre feet per year per acre on the lands subject to scarification. The increase would equal 77.33 acre feet per year, decreasing at a rate of 20 per cent per year, reaching undisturbed levels after five years. Therefore, the increase in total yield would equal 232 acre feet for the lands subjected to mechanical scarification. This is not a significant amount in the total annual yield of the JSYU.

Herbicide Site Preparation

Overland Flow

Overland flow of herbicides would occur only if overland flow of water occurred. Overland flow of water is quite uncommon on Western Oregon forest lands. The infiltration capacity of forest soils far exceeds the rate of precipitation. There are areas, such as roads, skid trails, landings, and outcrops where some localized overland flow would occur. Field testing on forest land's has given evidence that overland flow of tested herbicides are restricted to localized events involving bare, compacted, or water repellent areas and litter adjacent to streams. The overland flow has shown a reduction in herbicide concentration in water as it moves over uncontaminated soil. Detectable amounts of herbicides would possibly reach streams and water

courses caused by spraying of unintended areas (pilot error), inadvertant spraying of previously undetected pools and intermittent streams, or accidental spills (see Figures 3-3 and 3-4). Leaching and surface flow would introduce some movement of a small amount of herbicide to adjacent streams. Recent research (Barnett et al., 1967) indicates that movement of detectable amounts of herbicides to streams could occur if there is appreciable precipitation shortly after application. Biological degradation then would be the primary means by which herbicides would be removed as environmental contaminates (Norris, 1967).

Available information indicates that small amounts of phenoxy herbicides enter streams flowing through areas being sprayed. During six years of monitoring spray operations in western Oregon, scientists have never found phenoxy residues exceeding 0.1 mg/l in western Oregon streams (Norris, et al., 1970).

Phenoxy chemicals entering water may be lost by volatilization, adsorption by biota, by degradation, and by dilution as additional stream flow passes through the site. Almost all authorities agree that there is adsorption on bottom sediments (Bailey et al., 1970) (Frank and Comes, 1967). Concentrations of low volàtile esters of silvex in water after application on the surface of three ponds decreased to nondetectable limits by the end of three weeks (Bailey et al., 1970).

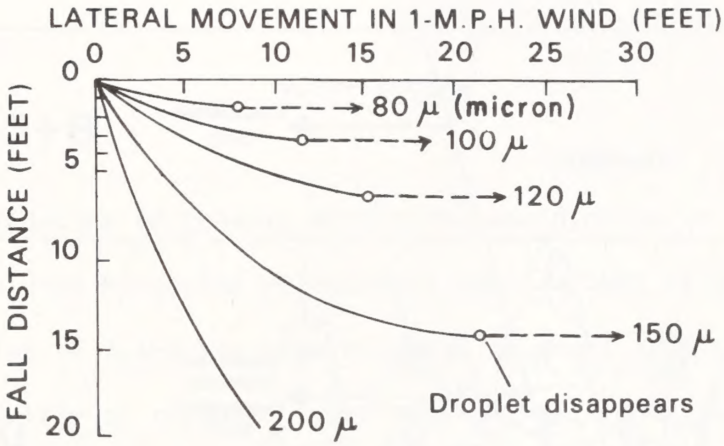


Figure 1.--Relation of vertical fall through air to lateral movement for water droplets falling at terminal velocity in a 1-mph wind. Calculated for 25° C., 50 percent RH, 760 mm Hg, and lateral air movement. (Adapted from "Pesticidal Formulations Research," with permission of The American Chemical Society (Seymour 1969).)

Figure 3-3 LATERAL MOVEMENT OF HERBICIDES

SOURCE: Gratkowski, 1974

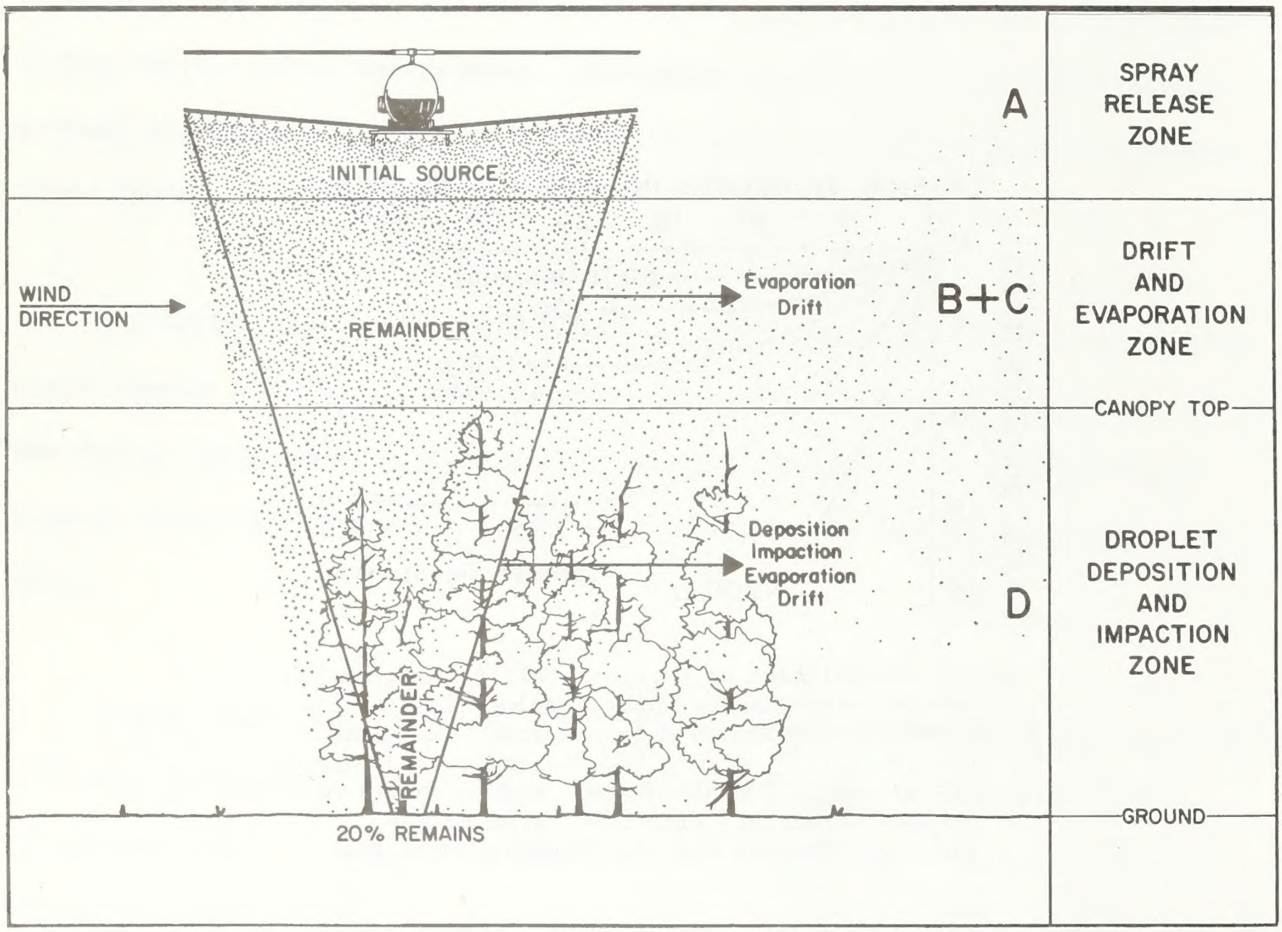


Figure 3-4 METHOD OF AERIAL APPLICATION OF HERBICIDES
SOURCE: Ekblad, 1976 in Baker, et. al., 1976

Only small amounts of herbicide would enter streams by washing action of rain from overhanging treated vegetation above a stream or from leaves falling into water (Norris, et al., 1970). Observations indicate that heavy fall rains would not leach detectable amounts of phenoxy herbicides through the soil into streams if the herbicides have been applied during the spring or very early summer. The phenoxy herbicides move through the soil only in very small amounts, and for very short distances.

Water Bodies

Rapid degradation of Phenoxy herbicides would occur in water, especially in bodies of water with histories of repeated applications of phenoxy herbicides. Rapid degradation of 2,4-D has been observed in water samples collected from areas with a history of repeated 2,4-D applications (Goertitz and Lamar, 1967).

Direct application or drift of spray materials are the principal routes of entry to forest streams (Figures 3-3 and 3-4). Herbicide concentrations in forest streams in or adjacent to treated areas would range from nondetectable limits (less than 0.001 ppm), to a maximum of about 1 ppm, with more than 99 per cent of all values less than 0.01 ppm (even when no particular effort is made to avoid direct application to stream surface with either ground or aerial application methods). Research has shown that the location of forest treatment units containing buffer strip along the streams reduced maximum

herbicide concentrations in streams to less than 0.01 ppm with residues detected for less than one day after application (Abrahamson and Norris, 1976).

Available information indicates that although some phenoxy herbicides may enter streams flowing through or adjacent to areas being sprayed, the levels in the streams will be very low. In six years of monitoring spray operations in western Oregon, scientists have never found phenoxy residues exceeding 0.1 ppm in western Oregon streams. Long-term low-level pollution is only found where phenoxy herbicides are applied directly on marshy areas (USDA Forest Service, 1974).

"TCDD"

"TCDD" (the contaminant in Silvex) is nearly insoluble in water -- 0.2 ppb (Dow chemical Company 1970). For this reason, it would be expected to remain on the surface of plants and soil at the application site. Because it is recalcitrant in soils, Kearney et al., (1973) concluded there would be "no ground water contamination problems." In the natural environment, any "TCDD" would be expected to be found associated with other constituents of the formulation which are less soluble than water. They would form a thin film on water surfaces. Such films would be degraded by sunlight, much like thin films on vegetation or the soil surface. Residues would be substantially less that would be indicated from research with pure laboratory systems that suggest that "TCDD" would be only slowly degraded in water (Kearny 1973).

The maximum stream contamination found by researchers coupled with field water samples from recent BLM projects (Anderson and Cameron 1977) suggests that the possibility of exceeding the recommended maxima (EPA 1977) is small This statement is based upon the premise that application is controlled and adequate buffer strips will be left along all flowing streams, bodies of water and marshes (see Section 1.6.4.2). Although the buffer strips are not the actual determent to the herbicide contaminating the stream, they do provide a specific chemical free zone which reduces contamination. It is possible to apply chemicals up to the stream edge without contaminating water (EPA 1977), however, the irregularity of terrain, stream courses, and physical features would make it almost impossible to accomplish this by aerial means. The situation for evergreen brushfields is expected to differ. The evergreen shrubs provide greater herbicide interception than do deciduous brush due to the full canopy. This interception would substantially reduce the amount of water contamination that would be anticipated in those areas during application of aerial herbicide.

The summer spray would allow less herbicide to reach the forest floor due to the full canopy available to intercept it. The streams would be at their very lowest, providing very little target area. Very little rain usually would be expected at that time of year, therefore almost no washing of chemicals into the streams would be expected. If the program extends into September, rain would be expected. Any chemical that would enter the stream would be likely to last longer due to the extreme low flow. With the exception of major water courses, most streams adjacent to herbicide application areas would carry a flow of less than 0.5 cfs.

If streams, bodies of water and marshes were not adequately protected, and all or part of the riparian zones and the water were aerially sprayed, contamination of water would occur at levels that could at some time exceed those normally anticipated for forest herbicide application. The recommended maxima for silvicultural chemicals (EPA 1977) would not be expected to be exceeded because past research indicates these levels can be met if care is taken not to get the chemicals in the water, (i.e. bufferstrips on all flowing water). The highest possibility of contamination at toxic levels would occur during the spring or winter application due to increased flow and limited foliage to intercept the herbicide. The duration of pollution would be on a declining scale with a peak less than one hour after treatment to a point ten days later when the chemical would become undetectable (Norris, 1975).

Planting

Planting trees in bare areas, reclaimed brushlands, and understocked lands would have a significant effect on runoff. Decreases in observed runoff by ten per cent and more have been reported after planting seedlings on logged areas (Anderson, et al., 1976). Planting would be done on 62,500 acres of the JSYU as part of the proposed action. An overall decrease in the annual yield of ten per cent would be anticipated for these lands as a result of planting. Assuming that these lands would be in a disturbed or partially disturbed condition prior to planting, the rate of annual yield would be the average rate of 2.5 acre feet per year per acre. The total annual yield prior to planting would be 156,250 acre feet per year from the 62,500 acres of land.

A ten per cent decrease after planting would be observed after no less than five years. Assuming the decrease would occur over these five years in two per cent per year increments, the total yield decrease would equal 46,825 acre feet from the 62,500 acres involved; or, on average of 0.75 acre feet per acre over the ten years of the proposal.

Water quality would change with time in proportion to the growth of the seedlings into trees. Nitrogen in run-off water would decrease, along with other chemical nutrients, as nutrient cycles re-established themselves. Suspended sedfment would decrease as run-off was slowed by an increasing duff layer. Temperature would go down in streams as shade increased; dissolved oxygen would increase as temperatures declined. Quantification is not possible since the exact areas to be planted are not known at this time.

Precommercial Thinning

Precommercial thinning (in which the small trees would be cut down and allowed to decay in place) would be done on 14,200 acres under the proposed action.

Little is known about the effects of precommercial thinning on the hydrology of the Forest Ecosystem (EPA, 1976). It is assumed that some slight increase in annual yield would occur as a result of precommercial thinning. The immediate increase in the rate of growth of the remaining trees would offset this impact within one year. The increased growth rate and the lack of

any surface disturbance in the management practice would preclude any significant effects on water quality.

Fertilization

The effect of fertilization would be the result of increased growth of all vegetation in the area of application; the impacts to water yield would be the indirect effects of increased evaporatranspiration of water by all vegetation in the affected forest ecosystem. The water transpired by the plants would be extracted from the soil by roots, allowing less to runoff into streams.

Yields were reduced by 24 to 28 per cent after fertilization following clearcutting in one reported study (Anderson, et al., 1976). An estimated decrease in water yield of up to ten per cent would be directly attributable to the increased growth of vegetation due to the increased availability of nitrogen due to fertilization.

Fertilization would be done on 18,900 acres as part of the proposed action. It is assumed that the lands that would be fertilzed would be yielding water at the rate of disturbance, or an annual yield of 2.50 acre feet per year per acre in the 1975 average water year. The annual yield from the lands that would be fertilized would total 47,250 acre feet per year prior to the application. After application, the annual yield would decrease to

42,525 acre feet per year. This would equal 2.25 acre feet per year per acre treated.

The effect of fertilization on water quality would be an anticipated increase in nitrogen in stream water. The typical reaction of a watershed to fertilization would be a urea concentration peak in the run off water within a few hours of application. Following this peak (over a period of a few days), a smaller ammonia peak would occur, followed a few days later by a smaller nitrate peak. The nitrogen from the fertilizer application would fall to background levels after a few weeks. Most of the fertilizer lost through streamflow would occur from November through Janurary (Fredriksen, et al., 1973). Levels of nitrogen in streams draining watersheds that have had nitrogen fertilizer applied have not exceeded public health standards for nitrogen (due to the application of fertilizer alone). Table 3-11 illustrates the results of nitrogen level investigations following fertilization projects in western Oregon and Washington. Impacts to the streams of the JSYU would exhibit similar responses as observed in the studies in Table 3-12; quantification is not possible since dilution factors, time of application, and the total annual yield for the water year involved all vary.

Summary Table

Since the proposal is complex, with many components that have opposing effects on environmental components, table 3-12 is provided on the following pages to illustrate the impacts. Totals of impacts for each component are

Table 3-11

Characteristics of Representative Forest-fertilization, Water-quality Study Sites, Pretreatment Levels, and Peak Concentrations of Urea-Ammonia- and Nitrate-Nitrogen Found in Western Oregon and Washington Streams Following Early Spring Fertilization

Location	Stand type and age	Area treated[1] (ha)	Percent of watershed treated	Mean Annual rainfall (cm)	Mean pretreatment concentration (mg/l)			Peak post-treatment concentration (mg/l)		
					Urea-N	NH_3-N	NO_3-N	Urea-N	NH_3-N	NO_3-N
Coyote Creek, Umpqua NF	Mixed conifers, old growth	68	100	120	.006	.005	.002	1.390	.048	.177
Trapper Creek Olympic NF	Douglas-fir 40 years	64	$<$ 10	102	.008	0	.034	.700	.010	.121
Jimmy-come-lately Creek. Olympic NF	Douglas-fir 10 years	49	$<$ 10	115	.002	0	.005	.708	.040	.042
Nelson Creek Siuslaw drainage	Douglas-fir young growth	38	100	153	.02	.01	.290	8.60	.32	2.10
Dollar Creek McKenzie drainage	Douglas-fir young growth	34	100	140	.02	.03	.060	44.40	.49	.13
Pat Creek Yamhill drainage	Douglas-fir 35 years	243	63	190	.003	.007	.070	3.26	.034	.388

1 All units were fertilized with urea at 224 kgN/ha in March or April of 1970, 1971, or 1972.

Fredriksen, et al., 1973

Table 3-12

Summary of Water Resources Impacts
(NOTE: This table is for summary and comparison only; it is not intended to replace derivitive narrative)

	Water Yield (compared to WY 1975)			Water Quality					
Management Treatment	Annual Yield	Average Peak Flow	Large Peak Flow	Total Nitrogen	Other Chemicals	Sediment Yield	Temperature	Dissolved Oxygen	Comment
SILVICULTURAL PRACTICES									
Two Stage Shelterwood	25,000 Ac.Ft. 0.3% increase	Site specific increase	Site specific increase	37,000 lb .000003% increase	slight increase	slight increase	slight increase	slight decrease	Effects of removing trees independent of any soil disturbance
Clearcutting	6,000 Ac.Ft. 0.07% increase	Site specific increase	Site specific increase	3,750 lb .0000003% increase	Slight increase	Slight increase	Slight increase	Slight increase	
Commercial Thinning	1,175 Ac.Ft. 0.01% increase	Site specific increase	Site specific increase	0.00000001% increase	Slight increase	Slight increase	Slight increase	Slight increase	
TRANSPORTATION SYSTEM:									
500 miles Permanent Road Constructed	7,880 Ac.Ft. increase	Slight increase	Slight increase	increase amount unknown	Slight increase	increase 1,400,547 tons over 10 years	Slight increase	Slight increase	Impacts due to road construction would be long term, permanent
100 Miles Road Reconstruction	788 Ac.Ft. increase	Slight increase	Slight increase	Slight increase	Slight increase	increase 121,893 tons over 5 years	Slight increase	Slight increase	
50 Miles Road Paved	236 Ac.Ft. increase	No change	No change	Slight increase	Slight increase	Decrease 495,579 tons over 10 years	Slight increase	Slight increase	
YARDING AND LOADING PRACTICES:									
Tractor Systems	6,722 Ac.Ft. increase	Site specific increase	Site specific increase	increase amount unknown	increase amount unknown	increase 1,175,175 tons over 5 years	Site specific	Site specific	Compaction & Surface Dists-turbance initiate impacts to runoff water
Cable Systems	8,005 Ac.Ft. increase	Site specific increase	Site specific increase	increase amount unknown	increase amount unknown	1,472,775 tons over 5 years	Site specific	Site specific	
Slash Disposal	300 Ac.Ft. increase	Site specific slight increase	Site specific slight increase	Slight increase	Slight increase	increase 90,000 tons over 5 years	Slight increase	Site specific decrease	Slash disposal would occur after yarding and loading of the timber

Table 3-12 continued

Management Treatment	Water Yield (compared to WY 1975) Annual Yield	Average Peak Flow	Large Peak Flow	Water Quality Total Nitrogen	Other Chemicals	Sediment Yield	Temperature	Dissolved Oxygen	Comment
DEVELOPMENT PRACTICES:									
Mechanical Scarification	77 Ac.Ft. increase	site specific increase	Site specific increase	Slight increase	Slight increase	Slight increase	Slight increase	Slight increase	
Herbicide Site Preparation	increase amount unknown	increase amount unknown	increase amount unknown	increase amount unknown	Slight increase	Slight increase	Slight increase	Slight increase	Some slight hazard of water contamination by herbicide drift or residue would exist
Planting	4,683 Ac.Ft. decrease	decrease amount unknown	decrease amount unknown	Slight decrease	Slight decrease	Slight decrease	Slight decrease	Slight decrease	
Precommercial Thinning	Slight increase	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Fertilization	4,725 Ac.Ft. decrease	decrease amount unknown	decrease amount unknown	Site specific increase	decrease amount unknown	Slight decrease	No change	Slight decrease	
TOTAL	51,500 Ac.Ft. per year or 195,250 Ac.Ft. over 5 years Compared to annual yield of 4,880,000 Ac.Ft. per year average discharge for Rogue River at Agness, OR This has slight significance to the water resources of SW Oregon.	Proportional increase as for annual yield	Proportional increase as for annual yield	40,750 lb minimum increase over 10 years .000003[illegible]% of average concentration of Rogue River at Agness, OR in WY 1975 This is not a significant increase.	Proportional increase as for total nitrogen	2,508,811 tons due to the proposal over 10 Equals 1.9% of average sediment yield for entire JSYU over 10 years This has localized significance in the areas affected by the proposal.	Proportional increase as for total nitrogen	Proportional increase as for total nitrogen	

provided, along with an estimate of the degree of change that quantity equals in terms of what occurred in the 1975 standard average water year.

Quantification has been done for all components where possible. For those components which cannot be quantified, either an estimated percentage change or a vector change is given where possible. Where no estimate of the impact can be given, "unknown" is placed in the appropriate space.

3.2 BIOLOGICAL ENVIRONMENT

The major vegetational impacts of the proposed action center around the removal of approximately 24 per cent of the old growth forest community from commercial forest lands in the JSYU and the associated replacement of the old growth community with early seral stage communities. As a result, an estimated 275 per cent increase over currently existing acreages in early successional stages is anticipated. Conversion of early successional communities to conifer-dominated later stages would be facilitated by planting, herbicide application, fertilization and other forest development practices. These practices would abbreviate the residence times of earlier successional stages, which naturally follow logging activities, thereby precluding maximum seral community stratification. Road construction supportive to timber management would remove approximately 4,400 acres from vegetative production for the life of the roadways.

The major impacts to terrestrial wildlife populations are associated with vegetational alterations and soil disturbance. The proposed action would contribute to an estimated 275 per cent increase in early seral stage habitat via the elimination of approximately 24 per cent of existing old growth and 18 per cent of existing mature forest habitat. However, truncated succession due to forest development practices would abbreviate the time that early successional stage habitat is available to wildlife. Destruction of mature and old growth habitat would be permanent because second growth trees would be harvested before they attained the ages of their predecessors. Snag removal, accomplished

during timber harvest for safety reasons, would eliminate critical habitat for a variety of animal species. The removal of dying trees for insect or disease control precludes the development of succeeding snags to replace those trees which eventually decay and fall.

An undetermined amount of TCDD (dioxin) bioaccumulation would be likely in animals exposed to silvicultural applications of the herbicide silvex.

Fish and aquatic invertebrates would be adversely impacted by bottom sediment accumulation and suspended sediment levels fostered by vegetation removal and soil disturbance characteristic of logging operations. The construction of logging roads would also contribute substantially to increased sedimentation in streams. Silvicultural applications of fertilizer may increase nutrient enrichment of streams, leading to increased algal growth which increases biochemical oxygen demand and, in turn, may decrease the amount of dissolved oxygen available for the sustenance of fishes. Silvicultural herbicide application would introduce undetermined concentrations of toxic chemicals in the aquatic environment. It is possible, although doubtful, that levels of toxic chemicals so introduced could exceed lethal levels for some aquatic organisms.

A tabular summary of major impacts is presented as Table 3-13. The quantification of impacts is based on a comparison of the current management plan with the proposed management plan (see Section 1.9).

TABLE 3-13 SUMMARY OF MAJOR IMPACTS TO BIOLOGICAL ENVIRONMENT

TERRESTRIAL VEGETATION

IDENTIFICATION OF MAJOR IMPACTS

Impacts	Unit of Measure	Current Mgmt (see Sec. 1.9) Short-Term	Long-Term	Proposed Mgmt. Plan Short-Term	Long-Term	(degree impacts would change) Short-Term	Long-Term	Remarks
Death of commercial trees	no. trees/ decade	228,000	unknown	164,000	unknown	-28%	less	no. trees based on avg volume/tree
Initiation of secondary succession	no. acres	65,600	unknown	55,000	unknown	-16%	-16%	
Elimination of mature communities	no. acres	0	41,000	7,000	37,200	+7,000 acres	-11%	new impact in Decade 1
Elimination of old growth communities	no. acres	44,000	126,640	27,000	111,423	-39%	-12%	
Alteration of community longevity	max. age attainable	80	80	80	80	none	none	Assumes max. comm. age age = 80
Destruction of surface vegetation	no. acres	13,300	-	25,400	-	+ 91%	-	increase indicative of higher intensity management
Alteration of plant habitat	no. acres	65,600	334,500	55,000	222,896	-16%	-16%	
Complete elimination of plant habitat	no. acres	4,400	4,400	4,400	4,400	none	none	
Introduction of exotic species	no.species	unknown	unknown	unknown	unknown	unknown	unknown	
Change in community structure	no. acres	65,000	334,500*	55,000	222,896*	-16%	-33%	* acreages in respective CFL bases
Seral Truncation	no. years	>1	>1	>1	>1	greater	greater	impact tied mainly to planting and development practices
Herbicide-induced reduction of non-conifer productivity	no. acres	0	0	47,700	unknown	+47,700	unknown	impact unique to proposal
increased productivity for conifers	% increase	unknown	unknown	unknown	unknown	greater	greater	impact tied to proposed development practices and stand regulation

TABLE 3-13 SUMMARY OF MAJOR IMPACTS TO BIOLOGICAL ENVIRONMENT

IDENTIFICATION OF MAJOR IMPACTS

Impacts	Unit of Measure	Current Mgmt (see Sec. 1.9) Short-Term	Current Mgmt Long-Term	Proposed Mgmt. Plan Short-Term	Proposed Mgmt. Plan Long-Term	(degree impacts would change) Short-Term	(degree impacts would change) Long-Term	Remarks
TERRESTRIAL VEGETATION								
Destruction of endangered species	no. species	unknown	unknown	unknown	unknown	unknown	unknown	
Herbicide-induced mutagenesis	no species impacted	none	none	unknown	unknown	unknown	unknown	impact unique to proposal
AQUATIC VEGETATION								
plant habitat displacement from bridges and culverts	perennial	7.2	unknown	7.2	unknown	none	none	
	intermittent stream miles	10.7	unknown	10.7	unknown			
Other community changes	unknown		unknown	unknown	unknown	unknown	unknown	
TERRESTRIAL ANIMALS								
increase in early seral habitat	% increase *	+300	unknown	+275	unknown	-25	unknown	* of BLM, JSYU Total
truncation of seral habitat	affect on animals	unknown	unknown	unknown	unknown	greater	greater	impact tied to planting and development practices
decrease in mature-old growth habitat	% decrease*	-35	-100	-22	-95	-13	-5	* Of BLM JSYU Total
Small mammals benefited by seral changes	* % species in Table 2-15	14	14	14	14	none	none	* Table 2-15 not inclusive of all species in JSYU
Small mammals unaffected by seral changes	" "	65	65	65	65	none	none	
Small mammals adversely affected by seral changes	" "	21	21	21	21	none	none	
Non-game birds benefited by seral changes	% species in Table 2-16*	24	24	24	24	none	none	* Table 2-16 not inclusive of all species in JSYU
Non-game birds unaffected by seral changes	" "	48	48	48	48	none	none	

TABLE 3-13 SUMMARY OF MAJOR IMPACTS TO BIOLOGICAL ENVIRONMENT

IDENTIFICATION OF MAJOR IMPACTS		Current Mgmt (see Sec. 1.9)		Proposed Mgmt. Plan		(degree impacts would change)		
Impacts	Unit of Measure	Short-Term	Long-Term	Short-Term	Long-Term	Short-Term	Long-Term	Remarks
TERRESTRIAL ANIMALS								
* Increase in deer carrying capacity	% increase	+600	unknown	+600	unknown	none	none	* on harvested buds only
Increase in potential elk use	% increase	+400	unknown	+400	unknown	none	none	" "
Increase in blue grouse & mtn. quail habitat	% increase	+300	unknown	+275	unknown	none	none	" "
Changes in invertebrate diversity	% change	unknown	unknown	unknown	unknown	none	none	" "
Changes in spotted owl populations	% change	assumed negative	assumed negative	assumed negative	assumed negative	less negative	less negative	
Impacts to reptiles & amphibians	—	unknown	unknown	unknown	unknown	unknown	unknown	
Increases in animal stress	no. species susceptible	unknown	unknown	unknown	unknown	unknown	unknown	
Permanent displacement of habitat	no. acres	4,400	4,400	4,400	4,400	unknown	unknown	
Lethal exposure to herbicides	no. animals	0	0	unknown	unknown	unknown	unknown	Impact unique to proposal
TCDD bioaccumulation	no. animals	0	0	unknown	unknown	unknown	unknown	Impact unique to proposal
Herbicide carrier toxicity	no. animals affected	0	0	unknown	unknown	unknown	unknown	Impact unique to proposal
AQUATIC ANIMALS								
Physical habitat alterations	Stream miles	unknown	unknown	unknown	unknown	unknown	unknown	
Biological habitat alterations	Stream miles	unknown	unknown	unknown	unknown	unknown	unknown	
Mechanical displacement of physical habitat by structures	Stream miles	7.2	7.2	7.2	7.2	none	none	
Toxic TCDD dosage	no. fishes affected	0	0	unknown	unknown	unknown	unknown	Impact unique to proposal
TCDD bioaccumulation	no. species susceptible	unknown	unknown	unknown	unknown	unknown	unknown	Impact unique to proposal
Fertilzer-induced eutrophication	Stream miles affected	0	0	unknown	unknown	unknown	unknown	Impact unique to proposal

3.2.1 Terrestrial Vegetation

Impacts on terrestrial vegetation are discussed by operational systems.

Based on the relative proportions of commercial forest lands in the different vegetation zones, approximately 93 per cent of all the land impacts of the proposed action will occur in the conifer/hardwoods and mixed conifer vegetation zones. Impacts are not quantified by vegetation zone due to the uncertainty of where specific management techniques will be applied.

3.2.1.1 Silvicultural Practices

For purposes of this analysis, the term "silvicultural practice" refers solely to a method of cutting timber and does not include the subsequent removal of logs or any other management practices.

Short-Term Impacts

Tree Mortality

The proposed action would result in the felling of approximately 164,000 commercial trees per year, based on a total annual harvest volume of 106 million board feet and an average net volume of 640 board feet per tree. In addition, an undetermined number of non-commercial species (equal to all the non-commercial specimens growing on areas to be harvested) would be cut.

Initiation of Secondary Succession

The removal of trees creates openings in the forest canopy, which allows more light to penetrate to lower forest strata. Timber harvesting, therefore, initiates secondary succession (Section 2.1.2.2, Succession) in the same way as other natural disturbances do. Different silvicultural systems open the forest canopy to different degrees, thereby influencing the plant composition and duration of the seral communities differently.

Clearcutting completely removes the forest canopy, thereby allowing the establishment of a well-developed grass/forb stage. Two-stage shelterwood cutting, by virtue of lessened canopy removal does not allow as much grass/forb development and probably produces an initial community more similar to a transitional grass/forb-shrub seedling community. Regardless of these potential differences, the short term impact of the proposal would be the conversion of approximately 55,000 acres of commercial forest to early seral stage communities (including both grass/forb and shrub/seedling seral stages).

Because natural succession is largely a function of time, the seral stage communities of 1977 will undergo transition. Some of these communities will succeed out of the early stages and into later ones. The number of acres which will undergo this transition is impossible to estimate accurately without a full tabulation of existing (1977) seral communities by actual age of individual parcels. However, if it is arbitrarily assumed that 50 per cent of the current (1976) early seral communities (roughly 24,500 acres) will

naturally succeed into the pole/sapling stage within ten years, it may be further speculated that approximately 67,250 acres of early seral communities would be in existence by the end of the first decade of the proposed management plan. In other words, the proposed action will contribute to an estimated 275 per cent increase in early seral stage communities in the next decade.

Concomitant with the creation of 55,000 acres of early seral stages is the removal of approximately 7,000 acres of mature and 27,000 acres of old growth forest communities. These reductions, as offset by small acreage contributions due to the progression of time, represent an 18 per cent reduction in existing mature forest and a 24 per cent reduction in existing old growth forest. The pole/sapling and young second growth stages will not be impacted by timber harvest during the first decade of the proposed plan. Their acreages may be expected to increase by roughly 150 and 100 per cent, respectively, however, because of successional recruitment from younger ages classes.

Commercial thinning, proposed for application on 4,700 acres, also opens the forest canopy but to a lesser degree than clearcutting or shelterwood cutting. Although understory vegetative production may be somewhat stimulated, canopy opening is not sufficient to allow development of earlier seral stages. Commercial thinning promotes accelerated rates of wood production in uncut trees. Thus, commercial thinning may be viewed as accelerating natural succession. This impact is generally negligible, however, because all merchantable timber will be harvested eventually.

Sanitation salvage logging, by the removal of individual trees, also stimulates growth in adjacent trees or shrubs. Therefore sanitation salvage logging impacts vegetation much the same as commercial thinning, only to a lesser extent.

Long-Term Impacts

Alteration of Community Longevity

Although forest trees are a renewable resource, mature (120-190 years) and old-growth (200+ years) forests are non-renewable on commercial forest lands proposed for high intensity methods of management in the JSYU. Although older trees harvested in conjunction with the proposed management plan would eventually be replaced by others of the same species, the replacements would not be allowed to attain the longevities of their predecessors.

It is estimated that 6,768 acres (eighteen per cent) of the currently existing mature forest would be cut during the first decade of the timber management plan. If the proposed plan were implemented into perpetuity, ultimate elimination of these age classes from high intensity management lands would occur within six decades. Similarly, it is estimated that 26,617 acres (24 per cent) of the existing old growth would be harvested during the first decade of the management plan. Ultimate elimination of old growth from high intensity management lands would occur within five decades if the management plan were implemented into perpetuity. Following the removal of mature and

old growth forests, the probable maximum age that commercial trees would reach before harvest is 80 years.

3.2.1.2 Yarding and Loading

Yarding is the movement of felled timber to a landing from which the logs are loaded onto a truck. Yarding in the JSYU is by tractor or cable. Based on past timber sale contracts within the district, it is estimated that approximately 77 per cent of the proposed harvest will be yarded by cable methods and 23 per cent by tractor. All the impacts from yarding and loading are expected to be short-term.

Direct Mortality or Injury to Plants

Both tractor and cable yarding entail dragging logs across the forest floor. Logs are constantly in contact with the soil in tractor yarding whereas with certain cable yarding methods the logs are suspended above the soil for most of the way to the landing. Tractor yarding, therefore, causes greater proportional mortality to forest floor vegetation than cable yarding does.

According to studies reported by the Environmental Protection Agency (EPA 1973), tractor yarding following clearcutting in western Washington resulted in baring 26.1 per cent of the site to mineral soil. If this relationship is applicable to the JSYU, approximately 287 clearcut acres can be expected to be

completely denuded of ground vegetation by the proposed action. EPA (1973) also reports that high lead cable yarding in conjunction with clearcutting bared 12.1 per cent of the site to mineral soil. Application of this data to the JSYU indicates that approximately 466 acres would be made bare of ground vegetation by clearcutting followed by cable yarding.

By assuming that the regeneration cut of a shelterwood system (which removes about up to 60 per cent of the forest canopy) results in only 60 per cent of the soil surface impacts of a clearcut, it is estimated that regeneration cutting followed by tractor yarding will bare approximately 1475 acres. It is further estimated that regeneration cutting followed by cable yarding will bare approximately 2950 acres.

The shelterwood final harvest cut (which removes the remainder of the canopy) in conjunction with tractor yarding is estimated to remove all the ground vegetation on approximately 216 acres. Shelterwood removal in conjunction with cable yarding is expected to bare the soil on approximately 430 acres.

In total, both yarding systems are expected to contribute to the total removal of approximately 5,100 acres of surface vegetation in the JSYU over the ten year life of the proposed action. Depending on the severity of subsequent erosion, the majority of the denuded areas can be expected to naturally revegetate within one or two years.

Both yarding methods may injure standing trees, exposing them to insect or fungus infestation which may eventually result in death. Tractors, or the logs being dragged by them, may collide with trees, bruising or slashing them. Logs suspended from cables may slip or swing into standing trees causing upper stem or crown injuries. The extent of mortality or injury to trees is impossible to estimate but is expected to be minor.

Alteration of Plant Habitat

Alteration of plant habitat is a function of soil disturbance and the destruction of vegetation which previously grew on the disturbed site. Skid trails and vehicle tracks, in addition to destroying vegetation, compact the soil, reducing its suitability for certain species of plants and favoring the invasion of species tolerant of compaction.

Yarding activities, especially tractor yarding, disturb forest litter and expose bare mineral soil, creating a better seed bed for many species (including Douglas-fir and most other conifers). Conifer reproduction, therefore, is enhanced by yarding activity, especially if associated soil compaction is not too great.

Skid trails often serve as channels for precipitation runoff and may reduce moisture infiltration on slopes. Therefore less moisture is available for plants near the upper ends of these trails, whereas plants at the lower ends of the trails may receive a disproportionate share. Depending upon

topography, runoff may impound at the lower ends of skid trails, creating temporary pools, or it may flow unimpeded into streams. In the former situation some vegetation (especially herbs) may be lost because of inundation while water-loving ephemerals may become established in the temporary pools. In the latter situation moisture stress may develop in the upper drainages, and gullies fostered by runoff may cut to bedrock and remain unvegetated.

3.2.1.3 Road Construction, Renovation and Maintenance

Road construction or renovation of existing roads is anticipated to add approximately 500 miles of road to the current network in JSYU. This construction would amount to approximately 4,400 acres. Many discrete impacting operations are associated with road construction and renovation. They include operation of tracked and wheeled vehicles, blasting, excavating, deposition of overburden and water application. All of the impacts are long-term and are expected to persist until roads are abandoned and rehabilitated.

<u>Complete Elimination of Vegetation</u>

Most of the roads to be constructed within JSYU will be permanent, with all-weather surfacing. This type of road requires construction techniques which completely eliminate vegetation from the roadway and shoulder. Subsequent maintenance activities prevent natural succession. Therefore, initial construction eliminates the existing vegetation while traffic and regular maintenance perpetuate the impacts of construction. The ultimate impact of

road construction and maintenance would be complete elimination of biological productivity (including timber production) on the entire 4,400 acres devoted to new road construction in the JSYU and perpetuation of this impact for the time that these roads remain under maintenance. The construction of these proposed roads would increase the total amount of acreage devoted to roads from the present 13,000 acres to 17,000 acres.

In addition to elimination of roadway vegetation, construction and maintenance may injure or kill adjacent vegetation. This effect could occur from bruises due to machine operation or from herbicide overspray along road shoulders.

Alteration of Plant Habitat

Road construction severely alters plant habitat both on-site and off-site. Soil compaction within the roadway is usually so great that many years would be required for plants to re-colonize, even if there were no traffic or maintenance.

Road surfaces are pitched to allow drainage. As water drains from the roadway and off the shoulders it creates moister soil conditions and provides habitat for plant species tolerant of disturbed soil and periodic excesses of water. Removal of vegetation from the roadway provides increased sunlight for roadside plants, which generally accelerate their growth in response. These factors (increased moisture, soil disturbance and increased

sunlight) are often responsible for the rank growth of roadside "invader species" which are periodically removed by herbicide treatment or other maintenance.

Blasting and excavation for roadways often generates spoil materials which are unsuitable for construction use or are in excess of needs. These materials are often deposited in areas away from the site. This practice creates a potential impact to offsite vegetation which may be injured or completely covered by the deposition of overburden.

Introduction of Exotic Plant Species

Road-building equipment may inadvertently transport seed or viable root-stocks from one locality to another. In some cases bulldozers, road graders or trucks may introduce the seeds of problem species, such as tansy ragwort, into new localities of the forest. As these plants become established they may out-compete native species at the site, establish reproducing populations and spread throughout the adjacent area.

3.2.1.4 Development and Protection Practices

Almost all development and protection practices require human activity for short periods, the effects of which are short-lived impacts that cease when the activity stops or moves on. Examples of these effects are noise and air pollution from operating machinery. Animals may be disturbed by sound or

smell, and the visual aspect of the forest is changed. The effects of the practices themselves, however, are longer-lived.

Development practices re-establish trees on forest land following harvest or natural catastrophes and ensure satisfactory or optimum growth. Individual practices are not necessarily used simultaneously, neither are they usually all applied to a single area. Many of the practices are alternative methods, the choice of which is dependent upon the conditions of the area.

Scarification

Scarification completely removes woody shrubs and removes or injures many plants in the herbaceous layer. All the impacts resulting from scarification are expected to be short-term. Threatened or endangered species could be killed or damaged. Soil moisture relationships would be affected by the break-up of the soil surface and the intermingled surface organic matter.

The disturbance of the soil would affect the availability of nutrients to the detriment of some species and the favor of others, due both to the physical mixing and to the changes in soil moisture relationships. Removal of vegetative material, which through a death and decay process ultimately would have become recycled nutrients for new plant growth, would be a loss of nutrients.

Sudden removal of the lower canopy and shrub canopy would allow more light to reach the nerbaceous layer, releasing those species to achieve their full photosynthetic growth potential. Increased exposure to sunlight would also affect soil temperature, which in turn affects soil moisture relation-

ships and a large range of biochemical reactions. Soil temperature increase would generally favor increased soil microbial activity and increased plant growth up to a point, beyond which any temperature increase would severely limit plant growth, especially by newly germinated plants or planted seedlings.

The primary impact of scarification upon forest vegetation would be a change in the structure of the pre-existing community. This change could mean total loss or reduction in quality of habitat on the site for affected species, including any threatened or endangered species present. Under the proposed timber management plan, approximately 160 acres would be mechanically scarified before replanting.

Slash Disposal

Burning

Slash disposal by burning would be practiced on about 10,100 acres. The effects of burning would be short-term and limited to small areas. While the chance of wildfire would be present, State and BLM safety measures would mitigate the hazard.

Burning usually eliminates most above-ground plant tissue, dead and alive, effectively returning all the nutrient elements tied up in the plant tissue to the soil as ash deposit, except for the portions lost to the atmosphere as smoke. The blackened ground would increase insolation, raising the soil temperature. Some of the nutrients in the ash could be lost to wind or

water erosion before they became incorporated into the topsoil, but, generally, nutrient availability would be increased in the burned areas (West, 1968).

Conifer and other plant seed could be destroyed or made sterile by the heat from the burning. Some plants, such as most grasses, have growing points that are close to or below the ground surface and can survive all but the hottest fire. Many shrubs have the ability to resprout from surviving stumps and roots and are stimulated by fire. So, while the immediate impact of burning would be bare black ground, secondary succession (accelerated by the crown canopy removal) would produce a more vigorous vegetative cover than existed before the area was burned.

The burning and deposition of ash and the resultant changes in soil moisture relationships, nutrient availability and soil temperatures would alter the structure of the original understory plant community. Scheduled replanting of Douglas-fir seedlings in the area would contribute to the alteration as a fire-induced seral stage became established. Threatened or endangered species could be lost to the community.

Gross Yarding

Gross yarding is an intensification of a conventional yarding method. As such, the effects of the vegetation and resulting impacts on the forest environment would be an extension of those analyzed under Yarding and Loading Practices above. Approximately 33,500 acres of logged sites would undergo

slash removal by gross yarding if the proposed timber management plan is implemented. Arbitrarily assuming that gross yarding would bare about 15 per cent of the treated acreage, it can be speculated that approximately 4,400 acres would be bared by gross yarding.

Planting

Short-Term Impacts

Under the proposed timber management plan, Douglas-fir seedlings raised in nurseries would be planted on 54,200 acres. Approximately 41,000 acres of this total would be on clearcut tracts or on tracts subjected to first-stage (regeneration) cut under a two-stage shelterwood harvest system. The remainder would involve replanting or interplanting of previously clearcut sites that are presently either not stocked or understocked. An aggregate of 12,300 of the total 50,200 acres would be programmed for possible replanting and interplanting on sites where the initial treatment failed to accomplish adequate stocking levels.

Planting practices are designed to shorten the time commercial conifer species otherwise need to become re-established after logging. Planting greatly increases the competitive advantage of the conifer seedlings over the vigorous released growth of the plant communities present on a logged area. Under the best possible site conditions, natural regeneration could occur in as rapid a span as one year. Under artificial regeneration, seedlings are

generally planted the first year following harvest. Because the planting stock is generally already about two years old, it has, as artificially planted trees, at least a one-year competitive advantage on good sites. This competitive advantage is greater on poorer sites. Therefore, planting shortens the amount of time required for natural succession to progress beyond the grass/forb and shrub/seedling stages.

Long-Term Impacts

The major long-term impact associated with planting is that, by increasing the competitive advantage of Douglas-fir, it truncates natural succession. In other words, early successional stages are more quickly passed through and Douglas-fir attains quicker site dominance. This acceleration not only reduces the residence time of early seral stages but also precludes the development of maximum plant diversity.

Chemical Weed Control (Herbicides)

Short-Term Impacts

Alteration of Natural Productivity. Herbicides are used to manipulate the species composition, size, density, vigor and presence of vegetation. In forestry applications, the desired impacts are to accelerate plant succession from early seral stages to later stages dominated by conifers. This seral acceleration occurs by selective limitation of competition from plants charac-

teristic of early seral stages in favor of rapid Douglas-fir establishment and growth.

Herbicides will be used in the JSYU both for site preparation (on 34,500 acres) and conifer release (13,200 acres). Both applications are targeted at the removal of nonconiferous species to provide a competitive advantage for conifers. Different herbicides work best for different target species (as explained in Section 1.6.4.1). Therefore herbicides are often used in combination.

The direct vegetational impacts of silvicultural herbicide treatments are short-term. Grass may be controlled for only one to three years with atrazine and dalapon while conifer seedlings become established. Grass may then partially reoccupy the site until Douglas-fir crown closure shades it out. Similarly, most species of shrubs will resprout after treatment. Brush may resume dominance after site preparation spraying. However, it will generally not resume dominance after stand release spraying.

Therefore, the net short-term impacts of successful site preparation spraying in the JSYU would be a temporary reduction (of unquantifiable magnitude) of the natural productivity of grasses on approximately 2,000 acres proposed for stand release treatments with atrazine and/or dalapon. In addition, natural production of forbs and shrubs would be reduced on approximately 11,000 acres to be treated for stand release.

A temporary reduction in the natural productivity of grasses, shrubs, and and herbaceous species would be expected on approximately 20,000 acres proposed for site preparation spraying with dalapon and atrazine. Temporary productivity reductions for herbs and shrubs would be anticipated for all 34,500 acres proposed for site preparation treatments with 2,4-D; silvex, roundup and krenite. These losses in herbaceous and shrubby vegetation production would be offset by increased production of coniferous species. Gratkowski (1967) reported that height growth of released trees was 29 to 86 per cent greater than was height growth of trees growing under live ceanothus.

Impacts to Non-Target Vegetation. Non-target vegetation, such as agricultural crops, stream buffers and rare or endangered species may be affected by the movement of herbicides through the air, water or soil. Herbicide application may result in short-term damage (or even destruction) of conifer stands. Minor burning of conifer needles is a common impact. These types of impacts defy accurate prediction and, therefore, cannot be quantified.

Long-Term Impacts

Plant Community Alterations. Brush control activities may result in the removal of major hardwood components in unmanaged forests. Therefore, herbicide application (in conjunction with other development practices) may result in the eventual removal of co-dominant species of hardwoods in the Douglas-fir/hardwoods zone. Through the use of herbicides in an even-aged management scheme, forests are produced with relatively even-aged stand structures on land previously occupied by uneven-aged, multiple storied

structures. Assuming that 35 per cent of the timber harvest would occur in the Douglas-fir hardwood zone and that a proportional amount of herbicide spraying would occur there, approximately 12,100 acres could be so changed.

As previously mentioned the direct vegetational impacts of herbicide application are short-term. The effects of accelerating the establishment of conifer stands, however, are long-term. Once the coniferous stands become dominant they will persist until the trees are harvested or until insects, disease or natural disasters remove them. Under fully managed conditions, the maximum amount of time the conifers can be expected to remain until logging is 80 years.

Mutations. 2,4-D has been shown to mutate certain agricultural plants. No specific effects are known for Silvex (Moah, 1969), however. Atrazine was shown to have a slight effect on meiosis when applied to the anthers of barley. No conclusive evidence of plant mutations was found for either dicamba or dalapon. The occurrence or significance of mutations arising in nature from the use of these compounds is unknown.

Fertilization

Approximately 22,300 acres of timber stands would be fertilized during proposed precommercial and commercial thinning operations. The impacts associated with fertilization would be short-term. This practice would mean a faster growth for commercial conifer species and changes in soil moisture relationships and nutrient availability that could favor the establishment of

new species while decreasing the vigor of, or eliminating, existing species. The physiology of threatened or endangered species and/or their competitive status in the community could be negatively impacted.

Precommercial Thinning

Precommercial thinning of some 14,200 acres would take place in the next decade under the proposed action. Removal of selected trees from the general level of the stand canopy would release the remaining trees from competition for light, moisture, and nutrients and thereby allow them a more optimum growth rate. Understory plants could be damaged during the thinning operation, including any threatened or endangered species present.

The stands treated would be so thick that most of the cut trees would remain in place, supported by living trees. Therefore, the resulting impacts to the understory vegetation would be gradual, as the dead trees fell and decayed with the passage of time and growth of the remaining stand. However gradual, the change in available light, soil moisture relationships, and nutrient availability could change the structure of the original understory community.

Fire Control

Fire suppression as a practice occurs on an emergency basis. Standard operations would be performed as suppression measures, but the extent and

intensity of their application would be determined entirely by unscheduled events of unpredictable magnitude, i.e., wildfires.

In general it can be assumed that any damage sustained by vegetation due to fire suppression activities would be less than that caused by unsuppressed wildfire. However, suppression activities would cause site-specific damage to surface soils or root systems that would have longer-lasting effects on vegetation than would burning but would affect relatively small areas. Examples are fire breaks, clearings for helicopter landing sites, and soil compaction due to wheeled or tracked offroad vehicles. This type of physical disturbance would kill and/or injure plants and could cause changes in the community structure. Threatened or endangered species may be impacted directly or indirectly.

More subtle impacts would be those perpetuated by continued fire suppression, in the form of changes in successional patterns that result from elimination of the natural influence of fire. For instance, in the Douglas-fir/Hardwoods Zone, some of the brushfield communities are fire induced and maintained, so that, with elimination of periodic wildfire, conifers could become established and eventually dominate the site (Franklin and Dyrness, 1973). On some sites in the Mixed Conifers Zone fire induced shrubs such as Ceanothus velutinus, by fixing nitrogen and shading, could provide a favorable environment for establishment of conifer seedlings; conversely, on other sites, the same shrub may become dominant and seriously hinder conifer establishment. Accumulation of understory vegetation due to fire suppression could provide a heavier and more continuous fuel situation that would allow inadvertent

wildfire to burn more intensely, destroying the upper canopy and timber species that would receive minimal damage under lighter fuel conditions (Arno, 1976 and Heinselman, 1971).

Silvicultural Control of Insects and Disease

Forest insect control by silvicultural methods would be a matter of discriminating for insect control in scheduled silvicultural practices and applying the same practices to specific problem sites. Impacts to the forest vegetation would be of of the same type analyzed under silvicultural practices in this chapter. Forest disease control by silvicultural practices would be a matter of discriminating for disease vectors in scheduled silvicultural practices, and when necessary applying these practices to specific problem sites. Impacts to the forest vegetation would be the same type analyzed under silvicultural practices elsewhere in this chapter.

Direct physical control of dwarf mistletoe, being essentially discrimination in normal silvicultural practices, should not cause any impacts not previously analyzed.

Conclusions

Alterations to community structure and community longevity will be the most significant impacts to terrestiral vegetation. Compared with the existing timber management plan, the proposed action would represent a short-term increase in the rate of mature community elimination but fewer acres would be eliminated in the long-term. These impacts are significant because they represent the long-term elimination of the majority of old growth and mature forest communities from commercial forest lands in the JSYU. Continued forest management would not allow natural succession to replace these communities with the passage of time because future forests would be harvested before they reached the 80-year age class.

Other impacts to terrestrial vegetation are less significant because vegetation which is disturbed or destroyed by timber management would eventually be replaced by other plants of the same species and natural succession would be given time to restore community structure.

3.2.2 Aquatic Vegetation

Most potential adverse impacts to aquatic vegetation in the Josephine SYU have been effectively mitigated in the proposed timber management plan.

Loss of a small amount of aquatic habitat would result from stream crossings of newly constructed roads.

It is estimated that one perennial stream (less than 5 cfs discharge) and four intermittent streams, on the average, must be crossed for each mile of new road construction. This means that 500 perennial stream crossings and 2,000 intermittent stream crossings could be expected with the proposed construction of 500 miles of new roads. Assuming that 90 per cent of all proposed stream crossings will be by culverts and further assuming that the average culvert length is 40 feet for perennial streams and 30 feet for intermittent streams, it may be further speculated that approximately seven miles of perennial and ten miles of intermittent stream and riparian vegetation will be eliminated over the ten-year life of the proposed action.

Bridge crossings do not replace stream beds as culverts do. However, due to the constant dense shade under bridges, they may alter the natural vegetative production in streams. Assuming that the average bridge is 18 feet wide, perennial stream productivity may be altered in approximately .2 stream miles. Productivity would similarly be altered on approximately .7 miles of intermittent streams.

Aquatic vegetation also occurs in seeps and springs which are widespread and varied in size and flow rates. Timber management practices could severely affect these relatively small ecosystems, to the point of complete elimination of the spring or seep area, by drying up the water source. Any degree of chemical or sediment pollution could occur to the water flow. Any degree of killing or damaging injury could occur to the plant species present. Even

slight modification would cause a change in species composition, i.e., relative numbers of each species in the community.

Fertilization of precommercially and commercially thinned timber stands and herbicide spraying, for site planting preparation and competition release, are not expected to significantly impact aquatic vegetation because of the no fertilization-no spray buffers along perennial streams. But fertilization necessary to revegetate roadsides could, through drainage and leaching, contaminate waters and thereby affect aquatic vegetation. Impacts would materialize as changes in both structure and composition of these plant communities. In the case of fertilizer pollution, increased nutrient levels in the water would favor an increase in algae and shade tolerant plants.

All impacts to aquatic and riparian vegetation are expected to be insignificant.

3.2.3 Threatened or Endangered Vegetation

In the absence of a detailed inventory of the vegetation on acreage identified as commercial timber base, it must be assumed that any of the species listed in Table 2-18, with locations confirmed or unconfirmed, could occur on any site that would be affected by the proposed timber management plan.

Listed species could be susceptible to any of the impacts described under terrestrial vegetation or aquatic vegetation. Under worst case conditions, the

direct effects of injury or death to the plants could cause the immediate extinction of a species in all or a significant portion of its range. The more subtle effects of vegetative community changes could cause the imminent extinction of a species through loss of competitive ability relative to other vegetation on the site.

If any species of vascular plant is determined to be threatened or endangered by the finalized listing (to be published by the U.S. Fish and Wildlife Service), any action that contributes to its extinction or to its threatened or endangered status would be in violation of the Endangered Species Act of 1973. Therefore the Environmental Assessment Report (EAR), that would be prepared prior to any site specific action, would identify any threatened or endangered plant species known to be present on the site.

3.2.4 Animals

The following analysis assumes that animal populations now in the JSYU are in equilibrium with the carrying capacity of their various habitats and that suitable habitat is randomly dispersed throughout the unit within the confines of the vegetation zones and seral habitats identified in Section 2.1.2.2. These assumptions are necessary for a qualitative evaluation of the impacts of a proposed action, which is not site-specific, on populations of unknown sizes and distributions. Each operational system is evaluated for its effects on animal populations exclusive of other management practices. Table 3-13 presents a cumulative summary of major impacts.

3.2.4.1 Silvicultural Practices

Silvicultural practices affect wild animal populations by altering habitat conditions and applying stress in the form of noise and activity associated with the cutting of trees.

Short-Term Impacts

Alteration of Habitat Conditions

As the vegetative community changes with timber harvest, associated changes occur in the conditions and types of food and shelter available. A definite, corresponding variation in faunal composition can be expected.

Community stratification and plant species composition differ with seral stage. As discussed in Section 2.1.2.2, plant community stratification and species composition are primary determinants of animal habitat. Therefore different seral stages generally are represented by different fauna. The seral stages, as earlier explained, are transitory, with early stages much shorter than later ones. As previously mentioned (Section 3.2.1.1) the proposed action will contribute to substantial changes in the amounts of seral communities.

Impacts to Game Animals. Black-tailed deer and elk are largely dependent on the early seral stages which result from logging operations. Deer are

primarily browsing animals, consuming the leaves and twigs of shrubby vegetation, although they will also eat some grass and herbs. Roosevelt elk are primarily grazing animals, consuming grass and forbs, although they will also eat some browse. Both grass and browse are more available in the cutover forest than they are in closed canopy stands. Therefore the carrying capacity of the land for deer and elk is increased by logging as long as the resulting vegetative community is composed largely of grass, shrubs and forbs and sufficient escape and thermal cover is maintained nearby. As previously discussed, grass, shrubs and forbs are probably most abundant for one to fifteen years following clearcuts west of the Oregon Cascades. Although no data are available, the same vegetative components are probably less abundant, and for fewer years, following shelterwood cuts.

The anticipated 275 per cent increase in early seral stage habitat should be beneficial for deer and elk carrying capacity. Assuming that the pre-harvest carrying capacity of the 55,000 acres to be harvested was approximately 10 deer per square mile (860 deer) and that the relationship shown in Figure 3-5 is valid for the JSYU, the carrying capacity of the additional early seral stage habitat could increase by 600 per cent to 60 deer per square mile (5160 deer). Although herbicides will undoubtedly alter the production of deer and elk forage, the effects are not expected to be significant (Section 3.2.3.4, Herbicide Treatment). In actuality, deer population would probably not increase because deer density in the JSYU is more regulated by the carrying capacity of winter and year long ranges than by forage abundance on the summer ranges, where most of the timber harvest would

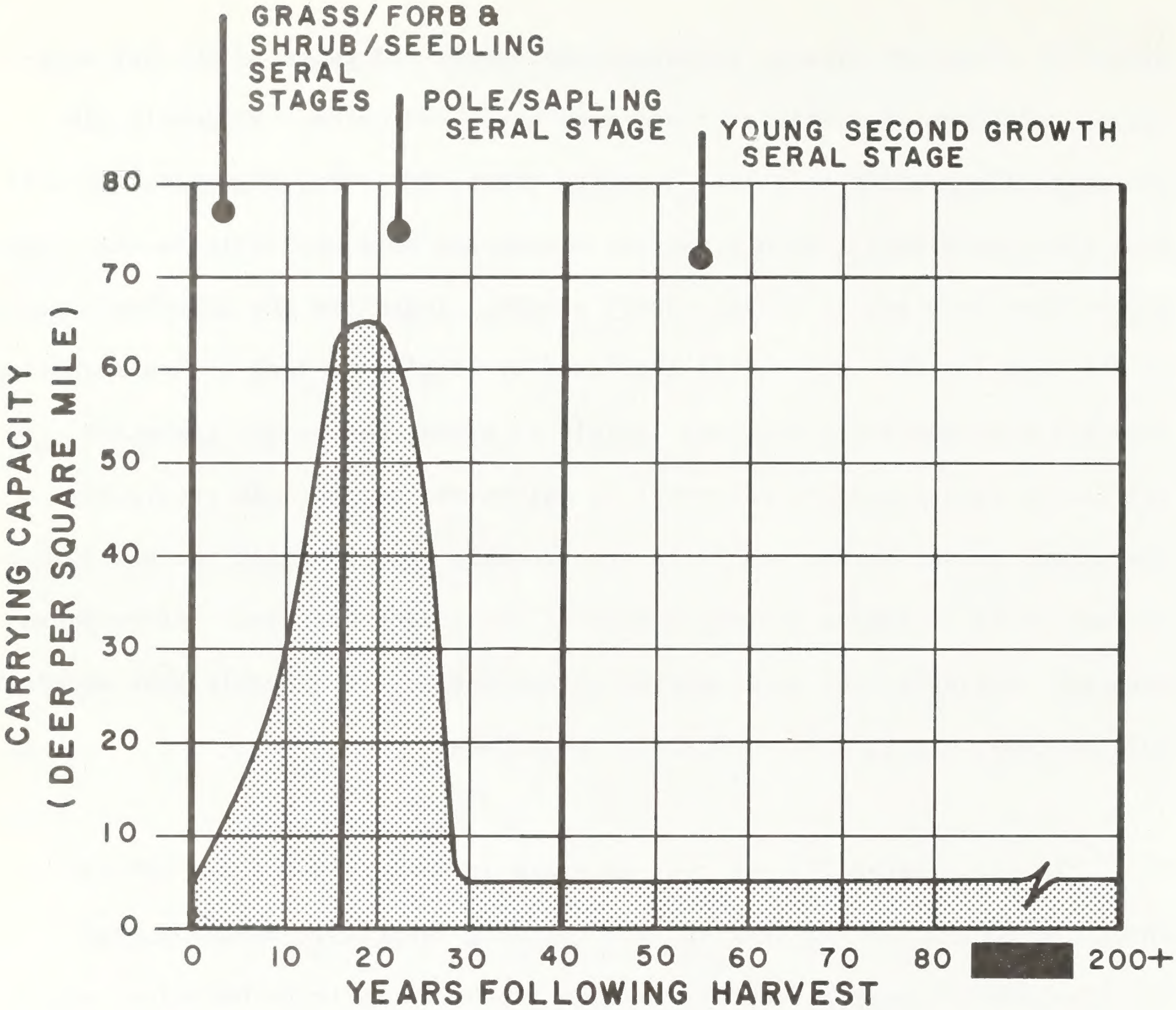


Figure 3-5 RELATIONSHIP BETWEEN TIME AFTER TIMBER HARVEST, VEGETATIVE SUCCESSION, AND DEER CARRYING CAPACITY*

SOURCE: Lawrence, 1969 & Meslow & Wright, 1975

*Values hypothetical for JSYU

occur. Also, the reproductive potential of most deer populations is not great enough to allow such dramatic increases in such a short time. The most probable impact is that deer populations in the JSYU would either increase very slightly or not all.

The same basic impact would be expected for Roosevelt elk populations As shown in Figure 3-6, elk use is highest approximately seven years following timber harvest (14 per cent as opposed to three per cent use one year after harvest). Therefore elk use could be expected to rise by over 400 per cent on the 55,000 acres to be subjected to timber harvest over the life of the proposed action. Actually this would not occur because elk density in the JSYU is not sufficient to allow significant short term response to widely dispersed, local forage increases. Most probably, elk populations would remain at low levels in spite of increased short-term forage supplies created by the proposed action.

Black bears have habitat requirements similar to those of deer and elk. For cover, they prefer brushfields interspersed within undisturbed coniferous forests. As with deer and elk, forest harvest increases the forage available for bears but may also reduce the amount of coniferous cover to the point where they may not go after the increased forage. Clearcuts provide more forage but partial cuts provide better cover. The proposed action, by virtue of its effect on early seral habitat, should increase bear carrying capacity. In view of recently observed population increases, bear density can be expected to increase in the JSYU.

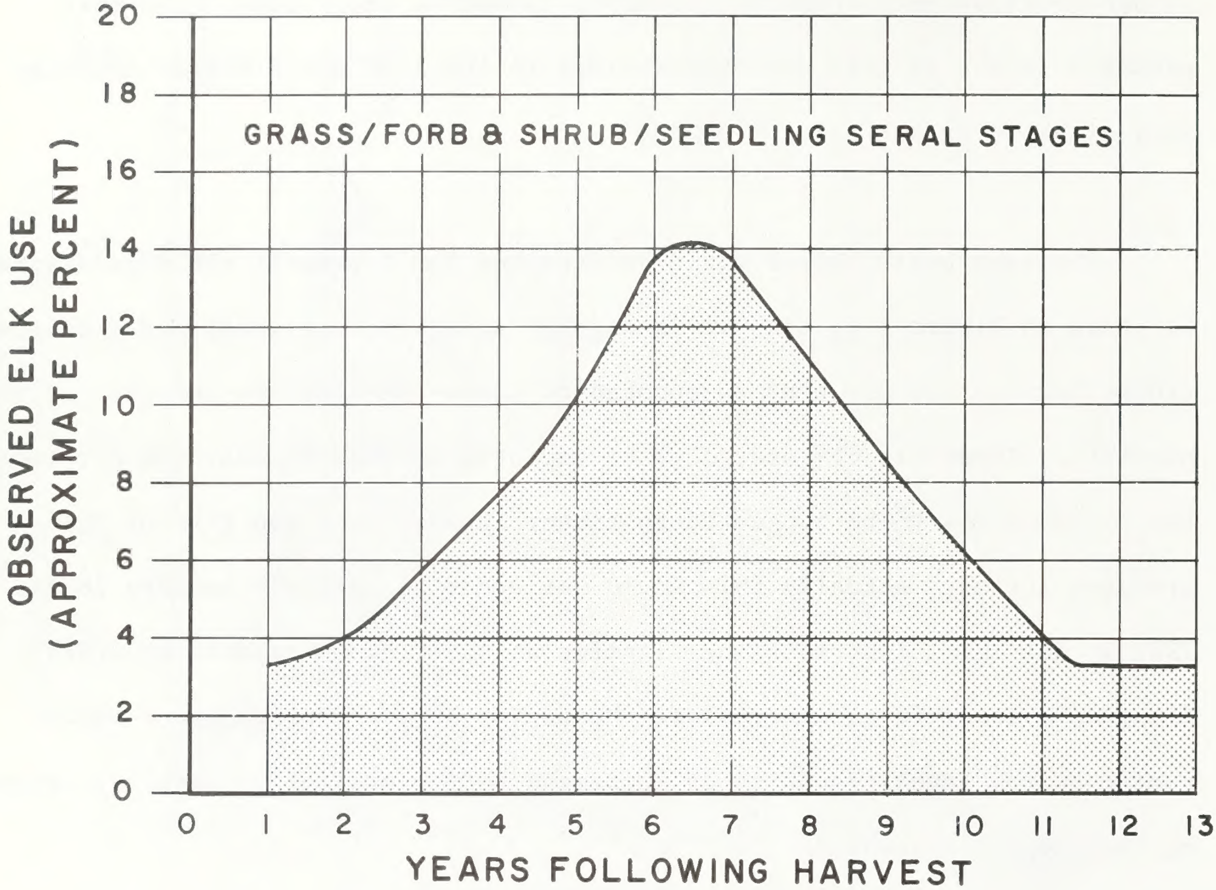


Figure 3-6 **RELATIONSHIP BETWEEN TIME AFTER TIMBER HARVEST, VEGETATIVE SUCCESSION, AND PERCENTAGE OF ELK USE***

SOURCE: Harper, 1969 & Meslow & Wright, 1975

*Values hypothetical for JSYU

Cougars generally base their territories in remote locations in mature forest communities in the JSYU. The animals have wide hunting ranges, however, which take them from the mature forest into habitats utilized by prey species. Black-tailed deer are probably the major prey. Therefore, timber harvest may reduce the suitability of cougar denning habitat while it improves the availability of prey. The disappearance of approximately 24 per cent of the existing old growth habitat should have a negative impact on the cougar population in the JSYU.

Mountain quail prefer brushy openings in forested mountains where they feed on seeds and berries. Timber harvest should increase the amount of mountain quail habitat by approximately 275 per cent. Clearcutting will provide the best habitat, although partial cutting will improve mountain quail habitat over that of the mature forest.

Blue grouse prefer clearcuts interspersed in heavily timbered areas. As such, timber harvesting would provide more habitat for these birds, with clearcutting being more beneficial than partial cutting. Ruffed grouse prefer meadow areas interspersed with timber in the mixed evergreen vegetation zones. The 275 per cent increase in early seral stage habitat will probably bring about population increases in these two birds.

Band-tailed pigeons, as migratory birds, primarily eat berries, nuts and fruits produced within brushy, cutover forest lands along their migration routes. Timber harvest within these migration routes will result in favorable

habitat conditions for band-tails as long as sufficient trees are left to provide roosting places. Timber harvest away from established migration routes will be inconsequential to the populations.

Non-Game Animals. Alteration of habitat due to canopy opening has a profound effect on small mammal populations. For the first several months following clearcutting, while vegetation remains sparse, a drastic reduction in species and numbers of small mammals is apparent (Hooven, 1969). As succession progresses to the grass/shrub and shrub/ sapling stages, however, small mammals increase in abundance and diversity in response to increased abundance and diversity of food. Tevis (1956), reporting on a study in the Douglas-fir region of Northern California observed that the populations of white-footed and big-eared mice, Townsend chipmunks, dusky footed wood rats, digger squirrels, chickarees, gray squirrels and brush rabbits increased following clearcut. He also reported that associated population declines were observed for red-backed mice, flying squirrels and shrew-moles. Studies reported by Hooven and Black (1976) for western Oregon indicate that Trowbridge shrews, deer mice, creeping mice, snowshoe hares and pocket gophers are more abundant in early seral stages following clearcut than they were in the uncut forest.

The reasons for increases in small mammal populations following clearcuts probably relate to the increases of seeds, berries and insects which result in association with increases in plant diversity and abundance during early seral stages. Both references cited above (Tevis, 1956 and Hooven and Black, 1976)

reported on mammalian populations following clearcuts. Only about 10 per cent of the proposed timber harvest will be accomplished by clearcutting, while the remainder will be partial cuts. No comprehensive data are available on the effects of partial cutting on small mammal populations. It is probable, however, that the effects are similar to those of clearcuts but do not produce changes that are equally dramatic. Population fluctuations would be moderated because some canopy remains after regeneration cutting, and the canopy is not completely removed until saplings of commercial tree species have begun to dominate the successional community.

The anticipated 24 per cent reduction in old growth and 18 per cent reduction in mature forest habitat will adversely affect species of mammals within the JSYU which preferentially utilize those habitats for feeding or reproduction. Among those species listed in Table 2-15 which will be adversely impacted by the proposed action are the long-eared myotis, big brown bat, raccoon, and marten. Assuming that currently existing habitats are already at carrying capacity, approximately a 22 per cent decrease can be expected in their population levels over the first decade of the proposed management plan. Most of the mammals threatened by mature and old growth habitat depletion are cavity users. They depend on natural cavities in large trees. Most of these cavities occur in mature or overmature trees or in standing dead trees. Oregon Forest Law (section 477.565) requires the felling of all dead trees and "snags" more than 15 feet high and 12 inches in diameter within an area concurrently with logging operations. The felling of these trees presents an immediate and obvious impact to species dependent on them for den sites.

Of the non-game animals tabulated in Table 2-13, 14 per cent would be benefited, 21 per cent would be adversely affected, and 65 per cent would be unaffected by silvicultural practices.

The impacts of silvicultural practices on bird populations are generally more obvious than they are on other animal groups. Birds are the most diverse group of vertebrates in the JSYU. Many species are highly specialized in feeding or nesting habitat and are therefore dependent on the stratification and species composition of certain plant communities represented by the seral stages which follow timber harvest. Changes in plant community stratification or species composition have direct and profound effects on the bird population which occupied any site before logging disturbance.

Of 80 species of non-game birds which breed in the Douglas-fir region in western Oregon, 85 per cent occupy the shrub/seedling seral stage (Meslow and Wright, 1975). As a comparison, 70 per cent occur in the mature forest. Fifteen per cent nest in the shrub/sapling stage while only four per cent nest in mature Douglas-fir forests. It should also be noted, however, that none of the species listed as nesting within the shrub/sapling stage do so primarily, whereas species that nest primarily in mature forests do not nest in other seral stages. Therefore, timber harvest in the JSYU will result in an estimated 22 per cent reduction in the amount of mature and old growth habitat on commercial forest land. Assuming old growth dependent animal populations are in equilibrium with current conditions, the proposed action can be expected to reduce the populations of these species by an equal amount.

Many of the bird species listed in Table 2-14 as nesting in the older second-growth and mature seral stages are cavity nesters (designated with + in the table). Removal of all dead trees and snags will impact dependent birds as it does dependent species of mammals. Of those species listed in Table 2-14, 24 per cent will be benefited, 28 per cent will be adversely affected and 48 per cent will be uneffected by silvicultural practices.

Furbearers. Two species of furbearers, the fisher and the marten are dependent on mature and old growth habitats in the mixed conifer and Douglas-fir hardwoods vegetation zones for reproduction. The 22 per cent decline in mature and old growth habitat will adversely impact their population levels. They can be expected to decline in direct proportion to declines in their habitat. Beaver, mink, river otter, raccoon and bobcat populations are expected to be unaffected by silvicultural practices.

Endangered and Threatened Species. Habitat alterations caused by silvicultural systems and associated cutting practices will have the same types of impacts on threatened and endangered species that they will on other wildlife. Some endangered species may be unaffected, while others may be adversely affected.

The peregrine falcon (endangered status) will probably be unaffected by timber harvest. The species is not a forest dweller, foraging in open spaces and preferentially nesting in rocky outcrops near water. Most suitable habitat for the peregrine is confined to the Rogue River Corridor,

for which no programmed timber harvest is scheduled. No peregrine falcons are known to occur in the JSYU, but they are expected occasionally along the Rogue River.

Northern bald eagles (threatened status) are present, although rare, within JSYU. The "wild" section of the Rogue River Canyon is the best foraging habitat for this species, and the mature forests in remote sections of canyon provide excellent nesting and roosting habitat. Harvest of mature trees adjacent to the Rogue corridor may eliminate some of this habitat, but the impacts are not expected to be great, unless the specific trees currently in use are removed.

The northern spotted owl (threatened) is dependent on tree cavities in old-growth, closed-canopy forests for nesting sites. No timber harvest is scheduled within 660 feet of known spotted owl nests. Eleven nest sites are known. Therefore 440 acres have been removed from the commercial forest base to protect the existing population of spotted owls. It is not known if this protective measure will be sufficient. Forsman (1976) reports that harvest activities in owl groves under 200 acres in size caused resident owls to abandon the site.

Since the peregrine falcon will probably not be impacted, formal consultation with the U.S. Fish and Wildlife Service (as directed in the Endangered Species Act Section 7 Regulations) is not required. However, the Fish and Wildlife Service was consulted informally during the preparation of this draft

environmental statement. The agency concurred with BLM that it is improbable that timber management as proposed in JSYU would impact the peregrine falcon.

The northern bald eagle (Federal proposed threatened status; Oregon list) and northern spotted owl (Federal status undetermined; Oregon list) are not officially listed on the Federal endangered and threatened species list and thus, formal coordination with the U.S. Fish and Wildlife Service was not required. However, in conformance with BLM policy (Manual Section 6840), the Fish and Wildlife Service was informally consulted regarding these species. The agency concurred with BLM that it is improbable that timber management as proposed in JSYU would impact these species. Also in conformance with BLM policy (Manual Section 6840), consultation and coordination with the Oregon Department of Fish and Wildlife is almost continuous with regard to these species. The proposed timber management plan provides safeguards for the protection of these species (see Table 1-9) which reflect BLM coordination with the U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife.

Aquatic. The impacts of silvicultural practices on fish habitats would be largely a function of the removal of vegetation. The impacts fall under the broad categories of increased accumulation of bottom sediments, increased turbidity, altered streamflow regimes, and introduction of logging debris.

The severity of these impacts is governed by the type of silvicultural system applied, the physical characteristics of the harvested site and the

stream and the susceptibility of the fish population. Most of the impacts in water quality are short-termed, depending on the length of time it takes for natural succession to adequately revegetate the watershed. Headwaters fish populations, however, may be impacted for many years, depending upon the severity of the impacts to aquatic habitat.

Increases in suspended inorganic sediment (turbidity) concentrations may cause direct fish mortality by increasing the adhesion of particles to salmonid eggs and by causing abrasion, thickening and fusion of gills. Prolonged exposures to concentrations from 200 to 300 parts per million are considered lethal (Gibbons & Salo, 1973). It is unknown to what extent, if any, these concentrations may be exceeded due to the effects of timber harvest in JSYU.

Although BLM regulations do not permit the felling or limbing of trees in or across streams, some logging debris is invariably deposited in streams either by logging activities or natural causes. Large accumulations of debris may form check dams that fill with silt, causing loss of food-producing rubble and gravel.

Organic debris may increase BOD and, therefore, decrease the amount of dissolved oxygen available for fish. If oxygen is severely depleted, fish kills can occur. Dissolved oxygen levels of less than 6 milligrams per liter (mg/l) result in metabolic changes, extreme stress and, if prolonged, death in most salmonid fish (Moring and Lantz, 1974). Although no data are available, it is probable that most streams in unlogged environments in the

JSYU contain 9 mg/l or greater oxygen concentrations. Organic sediments may also promote the growth of bacteria which attack fish gills, resulting in suffocation. Suspended conifer fibers have also been shown (Kramer and Smith, 1965) to inhibit gill functions, thereby reducing survival of young rainbow and brown trout.

Invertebrates. Terrestrial invertebrate populations will be locally impacted by community changes initiated by silvicultural practices. Although habitat requirements are not well understood for many terrestrial invertebrate groups, it can be assumed that invertebrate species composition and population abundance are determined by the diversity of available niches and the quantities of available types of food.

Plant diversity is greatest during the early stages of succession following harvest. Therefore, a greater diversity of live plant-feeding arthropods can be expected in the early stages of succession following timber harvest. Concomitant with the expected increase in diversity of plant-feeding species, the diversity of predaceous invertebrates should increase.

Maximum invertebrate diversity should occur at about eight to ten years after clearcutting, in the early shrub/sapling seral stage. Because vegetational stratification is more complex in the early stages following shelterwood silviculture, maximum diversity should occur sooner following the regeneration cut.

Although silvicultural practices may impact local invertebrate populations, impacts to regional populations will be negligible. Most of these populations are astronomically large and capable of sustaining high periodic mortality rates or local outbreak conditions without detectable population oscillations.

More important than the direct impacts of silvicultural practices on invertebrate populations are the impacts of invertebrate population changes on animals that feed on invertebrates. Tevis (1956) showed that the white-footed mouse selected insects as 60 per cent of its diet in cutover forest land while only 44 per cent of its diet in mature forest habitat. He then concluded that the diversity of insects in cutover land may be at least partly responsible for increased numbers of mice in cutover lands as opposed to mature forests. Hooven and Black (1976) suggest that post-logging population increases in deer mice may also be related partially to the increased availability of insects. Townsend chipmunk population increases may also be partially linked to insect diversity. Tevis (1956) reports that insects represented about 23 per cent of this chipmunk's diet. As noted by Hagar (1960) many birds which are most abundant in the early seral stages following timber harvest are at least partly insectivorous. It is probable that some of their population abundance is attributable to increased insect diversity.

Noise Stress

The effects of chainsaw noise on wild animal populations are unknown, but it can be expected that some animals may be sensitive to noise stress. In

some cases the stress may be sufficiently severe to force individuals to emigrate, but they should return when it quiets down, provided that other habitat conditions remain suitable for them. Increased noise levels should have no impact on fish or invertebrates.

Long-term Impacts

Alteration of Habitat Conditions

If the proposed management plan were continued for 60 years after its implementation, all the old growth habitat on high-intensity managed commercial forest lands would be exhausted. In addition, approximately 95 per cent of the mature forest habitat would be depleted. Therefore, if all mature and old growth habitats are assumed to be currently of carrying capacity, it can be assumed that virtually all dependent wildlife populations Table (2-13 and 2-15) would be eliminated.

With the gradual, progressive loss of old growth, high volume stands, more acres of younger age classes would have to be harvested. This increase in acres to be harvested would create more early seral stage habitat, thereby potentially benefiting animals which are dependent upon it. This increase in amount of habitat cannot be quantified. Similarly, the acreages of pole/sapling and early second growth habitats would increase as a function of natural succession through time. These acreages cannot be estimated either. The impacts of increased amounts of these habitats would be negligible except

that they would provide cover for some species (including deer and elk). Deer and elk populations, however, could not be expected to increase dramatically because of the population constraints provided by limited amounts of winter range.

3.2.4.2 Yarding/Loading

The impacts of yarding and loading operations on wildlife populations differ with the type of operation and the susceptibility of the animal. The main impact is the skidding of logs, which destroys low vegetation, compacts the soil and alters drainage patterns. As discussed earlier, the intensity of these disturbances differs with the yarding system and the physical environment in which it is applied. The main impacts to wildlife populations include alteration of habitat conditions and noise stress.

Short-term Impacts

Alteration of Habitat Conditions

Impacts to Terrestrial Animals. Yarding and loading practices are probably less detrimental to wildlife habitat than is the cutting of trees, with the possible exception of small rodents and ground-dwelling insectivores. The complete (but temporary) destruction of 6,500 acres of surface vegetation (see Section 3.2.1.2) would lower the amount of habitat for small rodents and insectivores. Shallow soil disturbances that do not remove excessive topsoil

may benefit local wildlife populations that depend on early successional communities (elk, deer, gramnivorous birds, certain rodents, etc.). Swanson (1970) reported significantly higher elk use on moderately or heavily disturbed sites than on lightly disturbed sites (Bunnell & Eastman, 1976).

Log skidding may also damage or destroy individual rodent nests, bird nests or insectivore burrows. The impacts are expected to be minor, due to the mobility of the animals and their abilities to re-nest within a short period of time.

Aquatic

The major physical impacts to fish habitat from yarding and loading result from increased sediment accumulations due to the erosion of skid trails. Skid trails contribute an unknown percentage of the gross amount of sediment load which enters streams as a result of logging operations. In addition to their contributions to gross sediment load, skid trails may also function as downslope channels, accelerating runoff velocities.

As previously mentioned, increases in sediment accumulation may physically impact aquatic habitat by:

a) Reducing inter- and intra-gravel waterflow, thereby reducing dissolved oxygen for fish and invertebrates.

b) Providing a physical barrier to the emergence of immature salmonids from spawning gravel.

c) Lowering the production of aquatic plants upon which many invertebrates and some fishes depend for food.

d) Reducing the suitability of stream bottom substrates for the attachment of aquatic macroinvertebrates.

In addition to physical impacts to aquatic habitat, increase in suspended sediments may directly injure fish and aquatic invertebrates by eroding gill membranes (Gibbons and Salo, 1973) and facilitating sediment adhesion to the chorion of fish eggs.

Tractor yarding is more injurious to aquatic habitat than cable yarding because it disturbs the surface more.

Increases in turbidity may reduce photosynthesis, alter stream temperature and precipitate organic particles which produce high biological oxygen demand (BOD) and lower the availability of oxygen.

Bedload sediments may severely damage fish habitat. Gibbons and Salo (1973) report that: (a) sediment filling gravel interstices reduces the concentration of dissolved oxygen available to incubating salmonid eggs; (b) deposited sediment may physically prevent the emergence of salmonid fry; and

(c) sediment reduces food abundance by promoting unstable substrates for aquatic invertebrates and periphyton. It is important to emphasize that the rate of sedimentation should be lower with the proposed action than with the existing management plan. However, bottom sediments will continue to accumulate in streams, thereby potentially increasing the impact of bottom sedimentation.

Timber harvesting increases streamflows, with different silvicultural practices producing different amounts of increase. These increases can be detrimental or beneficial to fish populations. Increased flows cause egg and alevin displacement and mortality as a result of gravel shifting. Benthic algae and insect populations, important as food sources for fish, are killed or displaced by gravel scourings. However, increased flows expand the available habitat for fish, thereby increasing the potential carrying capacity of the stream.

Noise Stress

Yarding and loading operations present a noise intrusion similar to that of silvicultural practices. However, in addition to the on-site noise intrusion, diesel log trucks moving logs away from the harvest site will create noise impacts to animals within earshot of the roads. Although the noise sources will be intermittent, they may be sufficiently severe to prohibit animals from utilizing roadside habitat.

3.2.4.3 Transportation Systems

Road construction, renovation and maintenance present a wide variety of impacts to terrestrial and aquatic animals and their habitats. Most of these impacts are directly related to the elimination of terrestrial vegetation. Terrestrial vegetation is the primary determinant of terrestrial animal habitat and also exerts the primary influence on the quality of the aquatic environment. The general impacts of road construction, renovation and maintenance include alteration of habitat condition and direct increases in animal mortality and stress.

Alteration of Habitat Condition

Terrestrial

Road construction requires the removal and disposal of all vegetation within the roadway, thus completely removing land within the roadway from vegetative production. Because subsequent renovation and maintenance practices, in addition to normal traffic, prohibit the development of vegetation, the presence of a roadway represents a complete loss of terrestrial habitat for the life of the facility. The 500 miles of roads proposed for construction will decrease the current amount of terrestrial habitat by approximately 4,400 acres, thereby increasing the total amount of habitat displaced by BLM roads in the JSYU from the present 13,000 acres to approximately 17,000 acres. This

impact would occur within the short-term time frame but would also be long-term in duration.

Although vegetation is eliminated from the roadway, road shoulders often support diverse vegetation communities characteristic of the early successional stages following disturbance of the forest floor and opening of the canopy. Shoulders may also be stabilized by the planting of forbs and browse species palatable to wildlife, further increasing community diversity and value to wildlife. The productivity and diversity of these roadside communities undoubtedly lessens the adverse impacts of the roadway proper. Periodic shoulder maintenance, where performed, keeps the community within the early successional stages beneficial to many species.

Aquatic

Logging roads are the greatest source of man-caused inorganic stream sediments (Gibbons & Salo, 1974). As previously discussed, increases in stream sedimentation may: a) reduce inter-and intragravel waterflow thereby reducing the amount of dissolved oxygen available for fish and invertebrates; b) provide physical barriers to the emergence of immature salmonids from spawning gravel; c) lower the production of aquatic plants, upon which many aquatic invertebrates and some fishes depend for food and d) reduce the suitability of stream bottom substrate for the attachment of aquatic invertebrates. Debris torrents or massive slides may be fostered by road construction in headwall areas and steep side canyons. These occurrences may completely

eliminate fish habitat for varying distances downstream. The impacts of such soil movements may persist into the long term.

Increases in Animal Mortality and Stress

Terrestrial

The increases in vegetative abundance and diversity along roadsides will increase animal use, thereby exposing them to increased probabilities of mortality from vehicle traffic. The impacts of these mortalities on animal populations will probably be minor.

Noise levels associated with construction activity will be relatively loud but of temporary duration. Noise sensitive animals may emigrate from the area until construction is completed. Traffic noises, although intermittent and of short duration, may similarly stress roadside animals and those within earshot of the road.

Logging roads also provide recreation access to areas that were, perhaps, less subject to use before road construction. This increased access may increase wildlife harrassment from hunters, off-road vehicle enthusiasts or other user groups.

Aquatic

Suspended sediment, increased due to road construction activity, may physically injure fish and invertebrate gill membranes and eggs. Laboratory studies summarized by Gibbons and Salo (1973) indicate that prolonged exposure to suspended sediment concentrations from 200 to 300 parts per million (ppm) is lethal to fish. It is not known how much sediment will be contributed to JSYU streams by logging road construction. Impacts will be greatest during the construction phase and for several years following construction, until road shoulders become adequately vegetated and surfaces stabilize.

3.2.4.4 Development and Protection Practices

Development and protection practices are undertaken to enhance timber production and to protect standing timber from destruction by various agents. The practices are varied and numerous but their major impacts all involve the alteration of animal habitat through vegetative manipulation. The impacts will be discussed for both terrestrial and aquatic animals under operational system headings.

Scarification

Although the impacts of scarification on wildlife populations are not well known, scarification can be regarded as generally shortening the residence time of earlier successional stages by providing conditions conducive to the

establishment of coniferous trees. Scarification in the JSYU will temporarily eliminate all the vegetation on 160 acres. The practice, however, does not eliminate earlier seral stages. The seral stages are merely abbreviated. Therefore the impacts to terrestrial animals which prefer early seral stages are still beneficial but the benefits are shorter-lived than if no scarification was undertaken. Bunnell and Eastman (1976) believe that light to moderate disturbance is probably beneficial to terrestrial wildlife because it stimulates vegetative productivity, whereas severe disturbance and compaction reduces the amount and productivity of habitat components. It is also probable that burrowing mammals and soil or litter invertebrates are adversely affected by the soil mixing and compaction that occur with scarification.

It is assumed that scarification also increases sedimentation in aquatic habitats. The impacts of increased sedimentation have been previously discussed.

Scarification is proposed for treatment of only 160 acres in JSYU. Therefore, impacts will be very minor compared to the impacts of more large-scale operations.

Planting

Planting is expected to accelerate early succession by at least 1 year (see Section 3.2.1.4 Planting). This would have the impact of eliminating at

least 7 per cent (4,700 acres) of the early seral stage habitat in the JSYU within 10 years, based on an average early successional stages duration of 15 years.

Seeding and planting, similar to other site preparation practices, tend to shorten the early successional stages following timber harvest in favor of rapid establishment of commercial tree species. Seeding encourages the short-term proliferation of seed-eating birds and mammals such as the dark-eyed junco and white-footed mouse. Some mice are particularly voracious feeders on Douglas-fir seed. Tevis (1956) reported that mice robbed 100 per cent of the Douglas-fir seeds planted in 100 plots, spaced at intervals of six feet, in two nights. Similarly, Crouch (1969) reports that deer browsing on young Douglas-fir seedlings can become a problem.

Planting should have no short-term impacts to fish or aquatic invertebrates. Any practice which encourages the growth of terrestrial vegetation should provide a long-term beneficial impact to aquatic habitats by reducing sediment loading of runoff water.

Chemical Weed Control (herbicide treatment)

Terrestrial Animals

Short-term Impacts. There are three major types of impacts to animals associated with silvicultural herbicide application - exposure to toxic chemical levels, habitat modifications and carrier impacts.

Exposure to toxic levels of herbicides. None of the herbicides proposed for use in JSYU forest applications have been reported to be highly toxic to wildlife, when used as manufacturers label prescribes.

Many researchers have reported that wildlife are bound to ingest herbicides by consuming contaminated food or water immediately past treatment.

However, studies have shown that an animal is unlikely to ingest toxic levels of herbicides from treated forage (Rudd and Genelly 1956; Springer, 1957; Mellanby, 1967; Montgomery and Norris 1970; and Norris, 1971). Springer, 1957 found that test animals are often repelled by herbicide residues on their natural foods, and will not eat freshly treated vegetation if other food sources are available. Newton and Norris, however, found that deer remained and fed in treated areas.

These researchers found that deer feeding on treated vegetation did not accumulate significant amounts of herbicide, even when exposed to maximum

field application rates of 2,4-D and atrazine residues of 2,4-D were found to be less than 0.006 ppm in the muscle tissue of deer 43 days after exposure. Atrazine residue could not be detected after 44 days. It must be recognized that Newton and Norris (1968 data) is not conclusive, but it does support the theory that ruminants are able to degrade herbicides and that little bioaccumulation occurs.

Much of the general toxicity attributed to 2,4,5-TP (Silvex) appears to be caused by the contaminant TCDD (dioxin). A general insufficiency of knowledge exists on the effects of field use of herbicides containing TCDD and the resultant impacts of residues on wild animals.

Pimentel (1971) and Witt and Baungartner (1973) report that Dicamba presents no hazard to man and low toxicity to wildlife. The EPA, 1974, reports that Dalpon has a short residual life and has low mammalian toxicity. The agency also reports that simazine has low toxicity to mammals, however, it does have some residual life.

Generally, herbicides have been found to be less toxic to birds than other pesticidies: Most acute toxicity LC_{50} 's (lethal concentration for 50 per cent of the test population) to birds tested were greater than 5,000 ppm. However, literature on the sub-lethal effects of herbicides on birds is limited.

The acute oral toxicity of 2,4-D fed daily to chicks for 28 days was found to be low (T Shirley, 1970). Kopischke (1972) reported that spraying of pheasant eggs with 2,4-D at concentration comparable to those of a normal field herbicide treatment did not affect hatchability of eggs or cause death or deformity in hatched chicks. It is reasonable to anticipate that result can be related to comparable birds of the forest.

Dalapon is relatively non-toxic to quail, pheasants and ducks. However, dalapon appeared to depress reproduction of ducks when they were fed levels of less than 25 per cent of those which produced mortality.

Beaver 1976, found that birds in herbicide treated areas shifted their diets and used alternative food sources. This factor may have been due to the loss of food plants rather than its contamination.

The effect of herbicides on native insect populations has not been studied; however, the effect of 2,4-D on bees has been studied by a number of workers. When 2,4-D dust was applied directly to bees and to the crawl space at hive entrances, neither the adult bees nor the brood were adversely affected (Palmer-Jones, 1964). Brydy reported total mortality of bees within 4 days of feeding with 30 micrograms of 2,4-D and 10 per cent mortality within 3 days with 20 micrograms (Brydy, 1962). Johansen (1965) reported that 2,4-D and related compounds were not toxic to bees, except when formulated as alkanolamine salt or the isopropyl ester (FS ES, 1977).

Morton (1972) fed herbicides to newly emerged worker bees, Apis mellifera L., in 60 per cent sucrose syrup at concentrations of 0,10, 100, and 1,000 parts per million by weight. Silvex, 2,4-D and dalapon were relatively nontoxic to honey bees at all concentrations (USDA).

Reptiles, amphibians and other organisms with limited mobility may not be able to avoid the herbicide treatments. Quantitative data is lacking on the impacts on these vertebrates and invertebrates. However, on any herbicide application areas are missed or not treated due to other considerations. Stream buffer zones will provide protection to the aquatic animals. Most amphibians and reptiles live beneath protective cover which will intercept most of the spray.

A summary of toxic levels of various herbicides to mammals is presented in Table 3-14 and a similar summarization is presented for birds as Table 3-15. Data are insufficient to speculate on the impacts of herbicide application on resident wildlife in the JSYU.

Carrier Impacts. Diesel oil is often used as a carrier (i.e. herbicide dilutant) for forest herbicide treatments with Silvex and 2,4-D. It is estimated that from 90,000 to 360,000 gallons of diesel oil will be required for herbicide application in the JSYU.

Data on the toxicity of diesel oil on wildlife is limited, however, a few studies have been conducted on the adverse effects of diesel oil on ducks.

TABLE NO. 3-14

TOXICITY OF HERBICIDES TO MAMMALS

	Chemical	(Oral) (Dose)	LD_{50} *	Source
Rat	Silvex		30 mg/kg	House, et al., 1967
Rat	Krenite		24,400 mg/kg	USDA, 1976
Mammal	2,4-D	(yes)	375-700 mg/kg	W.H., and Baumgartner, 1973
Rat	2,4-D	(yes)	666 mg/kg	Spector, 1955
Mouse	2,4-D	(yes)	375 mg/kg	Spector, 1955
Rabbit	2,4-D	(yes)	800 mg/kg	Spector, 1955
Dog	2,4-D	(yes)	100 mg/kg	Spector, 1955
Guinea pig	2,4-D	(yes)	1,000 mg/kg	Spector, 1955
Mule deer	2,4-D	(yes)	400-800 mg/kg	Tucker & Crabtree, 1970
Mammals	Silvex	(yes)	650 mg/kg	Witt & Baumgartner, 1973
Mammals	Atrazine		1,750-3,800 mg/kg	Witt & Baumgartner, 1973

* LD_{50} = lethal dosage for 50 per cent of the sampled population.

Table 3-15

Dietary toxicities of Herbicides tested in 5-day diets of young bobwhites, Japanese quail, ring-necked pheasants, or mallards (1964-73) Fish and Wildlife Service - Wildlife Report No. 191

Compound Species	Age (days)[a]	No. of conc.[b]	No. birds/ conc.	Toxicity Statistics LC50c	(95% C.L.)	Slope[d]	(S.D.)	RTD[e]	(95% C.L.)
Dalapon, sodium salt[g]									
Japanese quail	12	3	14	5000	(No mortality to 5000 ppm)				
Ring-necked pheasant	10	3	8	5000	(No mortality to 5000 ppm)				
Mallard	10	3	10	5000	(No mortality to 5000 ppm)				
Atrazine									
Bobwhite	9	3	10	5000	(No mortality to 5000 ppm)				
Japanese quail	7	3	14	5000	(No mortality to 2500 ppm, 7% at 5000 ppm)				
Ring-necked pheasant	10	3	8	5000	(No mortality to 5000 ppm)				
Mallard	10	3	10	5000	(No mortality to 2500 ppm, 30% at 5000 ppm)				
Silvex (2,4,5-TP)									
Japanese quail	12	3	14	5000	(No mortality to 5000 ppm)				
Ring-necked pheasant	10	3	8	4500	--		96		--
Silvex, butoxyethanol ester									
Bobwhite	14	3	10	3031	2441-3774)	10.808	(3.945)	113	(84.2 -160)
Japanese quail	14	3	16	5000	(No mortality at 1250 ppm, 6% at 2500 ppm, 12% at 5000 ppm)				
Ring-necked pheasant	10	3	8	2100	--		44.7		--
Mallard	10	2	8	5000	(No mortality to 5000 ppm)				
2,4-D, dimethylamine salt									
Bobwhite	23	2	7	5000	(No mortality to 5000 ppm)				
Japanese quail	20	4	20	5000	(No mortality to 5000 ppm)				
Ring-necked pheasant	10	3	8	5000	(No mortality to 5000 ppm)				
Mallard	17	3	8	5000	(No mortality to 5000 ppm)				

The acute oral LD_{50} to male and female mallards, greater than 12 months in age, is given as greater than 20 ml/kg (Tucker and Crabtree, 1970). In this study none of the animals died at the highest dosage given (20 ml/kg). This acute oral LD_{50} for healthy white ducks was found to be greater than 24 m/kg (Hartung, 1966). This quantity is far higher than a duck would consume with foliage sprayed during a normal forest application of herbicide. A bird may also ingest some diesel oil by preening itself after being exposed to spray. It was found that a duck ingested through preening about one third of the oil sprayed on its feathers (Hartung, 1965).

The use of heavy amounts of diesel oil could possibly adversely affect . the hatchability of eggs that are sprayed. An oil coating on the eggs will block gas exchange through the shell and the embryo will die. In one study 57 viable pheasant eggs were sprayed with diesel oil to runoff, none of the eggs hatched (Koppischke, 1972). This is a far larger amount of spray than the eggs would receive in a normal forest application. In another study fertile chicken eggs were sprayed with diesel oil at the rate of 10 gallons per acre, none of the eggs hatched. Further studies showed that just coating the large end of the egg with diesel oil was adequate to kill the embryo (Kieth, 1964).

Because the dormant sprays, using mostly diesel oil as the carrier, are applied early in the year, they are not expected to interfere with the nesting success of oviparous wildlife species. Most birds place nests in sheltered areas to protect them from predators. Also, if birds nests are aborted early in the reproductive period, most species will renest.

Of the forest animals, birds may be the most susceptible to the impact of oil used as a herbicide carrier.

Any bird accidentally receiving a complete soaking during a herbicide application could lose the ability to fly. Loss of flight capabilities subjects the bird to predatory animals.

A secondary, but important impact of oil on birds feathers, is the loss of structure caused by matting. Birds which flush or fly directly below an airplane may receive a complete wetting of spray. Matted feathers provide no insulation characteristic, thus a bird can become susceptible to hypothermia, or rapid heat loss. Early spring applications of herbicides are the most critical to birds, because of coinciding cool weather. A combination of factors reduces the possibility of birds from being contaminated with oil, these include; the small amount of oil carrier used per acre, the volitilization of a portion of the sprays, and the natural feature of overhanging vegetation intercepting most herbicide. Also, birds are mobile and may flush prior to the arrival of the treatment aircraft, due to the noise factor.

In summary, data are insufficient to accurately predict the impacts of diesel oil carrier on populations of animals in the JSYU.

Habitat - Modification Impacts. Herbicides have pronounced impacts on wildlife habitat. These impacts are brought about by losses of habitat diversity and stratification. The harvest of timber initiates secondary plant

succession (see section 3.2.1.1). Herbicide application, in addition to other development practices, alters the natural rate of successional progression. It is generally recognized that wildlife population responses to herbicide application are largely a function of resultant changes in plant succession and not the herbicide treatment directly.

Herbicide treatments can be used to advance or retard the successional stage of a plant community. The objective of herbicide treatments used in the forest development program is to reduce or retard vegetative growth competing with conifer establishment by either advancing or shortening the time period of the early successional stages. The successional stages in which herbicide treatment has the most accelerating effect are the grass forb, shrub seedling, and pole-sapling stages. The grass/forb and shrub/seedling stages are especially important to a variety of wild animals in the JSYU (see Tables 2-13 and 2-14), including all of the major game species. Although herbicide treatments generally only temporarily eliminate certain brushy or herbaceous components, the reduction in forage availability may adversely impact animal populations.

Several authors have concluded that herbicide treatments generally provide improved habitat for the larger game animals. Black (1970) found fewer small mammals and birds on treated sites after the vegetation was decreased by herbicides which reduced the available cover, and as the vegetation recovered, so did the animal populations. Conversely, deer use increased on treated areas, one year past treatment, in a greater proportion than on untreated areas.

In other studies, Black and Hooven (1974) found that herbicide effects on small mammal populations in the mixed conifer region of southwestern Oregon was somewhat different. Populations remained similar between treated and nontreated plots except for pocket gophers, which decreased on treated sites.

Borrecco (1973) reported differential responses of mammals to herbicide treated areas in the Douglas-fir region of western Oregon. Meadow voles, vagrant shrews and jumping mice decreased while deer mice and trowbridge shrews increased. Black-tailed deer use increased on the treatment areas. These population changes were related directly to habitat modification which was characterized by elimination of annual grasses, partial reduction of forbs and perennial grasses and temporary suppression of browse species. Follow-up studies on Borrecco's plots by Black and Hooven (1974) showed that within two years or less, treated habitats had returned to normal, and composition of small mammal communities on treated plots was similar to untreated plots (USDA 1976).

Harper (1971) reported that elk were adversely affected when ground forage was removed by herbicides, but were benefited by opening up of dense brushfields. In this study, many of the mature shrubs were not killed but just set back by herbicide treatments and many resprouted proving excellent forage for deer and elk. Harper warned that increased tree browsing may result when preferred browse species are removed.

Mueggler, 1966, used a mixture of 2,4-D and 2,4,5-T in northern Idaho, to determine the impacts and opportunities to improve wildlife habitat. Contrary to Harper's findings, Lyon and Mueggler, 1968, found that the long term impact was a lag in plant mortality of undesirable species. Desirable species exhibited poor persistence of sprouting and quick recovery from crown dieback. Plants with crown dieback tend to basal sprout more readily. Redstem ceanothus Ceanothus sanguineus), the most desirable browse, was killed by all treatments.

Some of the cut-over coniferous forest land in the JSYU tends to proceed to a brushy stage of brush with a dense canopy reaching ten or more feet off the ground. Wildlife forage is practically unavailable under this type of vegetative structure because the palatable forbs and browse is shaded out. The palatability of plants growing under a dense canopy, in limited sunlight, have reduced nutritive value than those growing in the earlier grass-forb successional stage. Therefore, the overall effect of herbicide treatments used in most forest applications is usually the shortening of the grass-forb stage in favor of a general advancement of the pole/sapling and young second growth stages. During the period after conifer release forbs flourish for a few years until brush or conifers invade and shade out other vegetation.

Herbicide treatments do not remove all the vegetation and a variety of untreated remaining plants still provide forage. However, the range of selectivity of some herbicides proposed for use is only moderately described in the literature. Response of non-target vegetation, such as forbs, is not well documented. Quite often the vegetation which the forest manager seeks to destroy or retard is a preferred wildlife forage item. All herbicide target

destroy or retard is a preferred wildlife forage item. All herbicide target species (see section 1.6.4.1) are utilized to some extent by wildlife as forage items, while others are used for nesting sites and cover.

Production of grasses would be reduced on a total of about 22,000 acres in the JSYU scheduled for treatments with atrazine or dalapon singly or in combination with other herbicides. Production of herbaceous and shrubby vegetation would be reduced on all 47,800 acres proposed for herbicide treatment. Treatments would therefore lower the maximum amount of forage that would normally be available under natural succession. However, the 250 per cent increase in the amount of early successional stage habitat that would be provided by the proposed management plan should more than compensate for any temporary loss of vegetative production. In other words, although herbicides would lower the productivity of early seral habitat, the acreages of these habitats would still be greater than those levels existing in 1976.

Long-term Impacts.

The major long-term impact of herbicide treatment to terrestrial animals is bioaccumulation. The term "bioaccumulation" refers to the uptake and storage (temporary or long-term) of a chemical by an organism. These organisms would then carry possibly toxicologically significant residues as food sources for other creatures. For instance, the amount of TCDD required to produce harmful effects in humans is spread out over such an area that direct personal exposure to that amount is unlikely. But if deer bioaccumulate TCDD as they

feed, human consumption of these deer could conceivably lead to significant human exposure. The same relationship holds true for lesser prey species and predators.

The degree of bioaccumulation depends on the magnitude and duration of exposure but available data (Marrow, 1975, Rose et al., 1976; Piper et al, 1973; Fries and Marrow, 1975; Norris, 1977; Matsumura and Benezet, 1973; Young et al., 1976; Meselson, 1977; Allen et al., 1977) indicate that most animals will accumulate TCDD in certain body tissues, at least for as long as exposure continues.

The significance of minor amounts of TCDD bioaccumulation is uncertain. However, recent experiments with primates (Allen et al., 1977) indicates that cumulative sub lethal doses of TCDD may result in death if a sufficient number of doses is received. In other words, these experiements indicate that the end result of exposure to lethal amounts of TCDD is the same, regardless of whether the dose is received in one exposure or cumulated after numerous small exposures.

Evidence opposing the cumulative effect is presented by Voss, et al, (1973 and 1974) with guinea pigs and rats. Datum is insufficient at this time to accurately speculate about the possible cumulative toxic effects of TCDD in humans or other animals which might come in contact with spray materials containing the substance.

Although 7,250-21,750 pounds of Silvex (which contains TCDD) are proposed for application in the JSYU, the amount of TCDD would be small and spread over

such a large area (29,000 acres) that animal exposure to a single toxic dose would be highly unlikely. Additionally, TCDD as it occurs in actual herbicide formulations generally degrades in one day, further decreasing the possibility of an animal contracting a single dose.

A "worst case" possibility, of course, always would exist that, through some catastrophe or error in application, lethal animal limits would be exceeded for a temporary period of time in the treatment of portions of the area. In such circumstances animal mortality would occur.

Aquatic Animals

Herbicides can be acutely toxic if concentrations in the aquatic environment exceed sub-lethal levels. The concentration of herbicides lethal to aquatic organisms is variable depending on such factors as pH, hardness of the water, temperature, oxygen content and flow level. All of the anticipated impacts to aquatic organisms involve toxic concentration of herbicides in water. Additional information would be required to identify impacts of sub-acute levels of toxicity on aquatic organisms and their habitats. Without such information it is impossible to speculate on long term impacts to the organisms or their habitat.

The Environmental Protection Agency (EPA, 1977) has determined that the following general factors influence impacts to aquatic organisms in stream environments:

1. Lower maxima are appropriate for extended exposure than for short-term peaks with the same safety factors in use.

2. Concentrations change slowly in large streams, and a greater chance for chronic exposure occurs from a given concentration.

3. Large streams at elevated concentrations elute larger amounts of chemical into the next larger stream than feeder streams of the same concentration, thus creating more general pollution problems for a given level of contamination (EPA, 1977).

4. Large streams contaminated at high levels offer little escape opportunity for organisms.

5. Sustained high levels of contamination, as might be associated with pollution of larger rivers, offer maximum opportunity for biomagnification of compounds having this tendency.

Table 3-16 presents data concerning observed toxic levels of herbicides, by aquatic organism, based on laboratory (aquarium) studies. In view of the facts that aquarium data may not be directly applicable to field conditions and that organisms tested may not indicate general tolerance levels for all aquatic organisms, researchers have recommended that maximum stream concentrations not be allowed to exceed the levels determined toxic for the most sensitive aquatic organisms.

Data presented in Table 3-16 indicate that most herbicides would probably have to exceed the 1.0 ppm concentration to become lethal to the

Table 3-16 . Effects of Common Forest Herbicides on Aquatic Organisms and Recommended Maximum Concentrations.

Compound	Test Organism	Dose in ppm/ Effect	Stream Concentration Recommended maximum	Reference
2,4-D	Bluegill	3.0/48hr. LC_{50}	0.03 ppm	OSU/EPA 1977
" Dimethylamine	"	166-458/48hr. LC_{50}		Lawrence 1969
" Isooctyl Ester	"	8.8-59.7/48hr. LC_{50}		"
" Butyl Ester	"	1.3 /48hr. LC_{50}		"
" Isopropyl Ester	"	1.1 / 48hr. LC_{50}		"
TCDD (Dioxin)	Coho Salmon	No effect 96hr. .000000056 mg/1	.000000006 ppm	OSU/EPA 1977
2.4,5-TP Silvex	Chinook	1.2/48hr. LC_{50}	0.01 ppm	OSU/EPA 1977
" PGBE Ester	Bluegill	25.0 /48hr. TL_m		Hughes & Davis 196
" PGBE Ester	Fish (saltw.)	0.36/48hr. TL_m		Butler 1965
" Butoxyethonal	Bluegill	2.0/48hr. TL_m		Hughes & Davis 196
" Triethylamine	Bluegill	20.0/48hr. TL_m		"
" Isooctyl Ester	Bluegill	5.0/48hr. TL_m		"
Atrazine	Crustacean	1-10/48hr. TL_m	0.1 ppm	Thut & Haydu 197
	Fish	1-10/48hr. TL_m		"
(Triazines)	Daphnia	1/48 hr. LC_{50}	(triazines)	OSU/EPA
Krenite	Bluegill	670/LC_{50}	5.0 ppm	OSU/EPA 1977
"	Rainbow Trout	1000/LC_{50}		Du Pont 1977
"	Fathead Minnow	1000/LC_{50}		"
Dalapon (Dowpon)	Daphnia	11/48hr. LC_{50}	0.1 ppm	OSU/EPA 1977
"	Bluegill	115/24-48hr. LC_{50}		Cope 1965
"	Bluegill	105/96hr. LC_{50}		"

LC_{50} = lethal concentration for 50% of test population.
LC_{50} = lethal dose " " " " "
TLm = Tolerance level for population median.
ppm = Parts of chemical per million parts of water: chemical mixture.

aquatic organisms tested. Field results in Coos Bay BLM District, where Silvex and 2,4-D were applied in 1977, indicated that of the eleven streams which were intensively monitored, nine were found to contain amounts of herbicide ranging from less than 0.001 ppm of silvex at some point within a 72 hour period. These streams were all protected with bufferstrips (Cameron and Anderson, 1977) as those in the JSYU will be.

TCDD (Dioxin) has been found to be extremely toxic in relatively small concentrations in the aquatic environment (Miller et al., 1973). In addition, a serious lack of knowledge exists concerning the effects of bioaccumulation of minute quantified of TCDD in the environment. It is impossible to speculate on the levels of TCDD, which might be expected to occur in streams within the JSYU.

In summary, based on concentrations of herbicides observed following spraying operations on BLM forests near Coos Bay, it is improbable that herbicide concentrations in JSYU streams will exceed the "no effect" level (.1 ppm) following herbicide application. This "no effect" level provides an estimated 10-fold margin of safety for most species which were tested by various laboratory researchers. Tolerance limits are not known for most of the species in the JSYU but it is assumed that concentrations of herbicide which do not exceed exceed .1 ppm would have little noticeable effect on the majority of species.

However, it is possible, under "worst case" situations that EPA recommended maximum stream concentrations could be temporarily exceeded as could lethal levels of many aquatic organisms. The highest possibility of this type of contamination would occur during spring or winter applications due to

increased surface flows and the limited amounts of foliage available to intercept the herbicide.

The impacts of dioxin (TCDD), a contaminant of 2,4,5-TP (Silvex) are impossible to predict for aquatic environments in the JSYU. Minor amounts of the substance will certainly enter the aquatic environment where it will proabably bioaccumulate to some extent in the aquatic food chain. The impacts of this bioaccumulation are unknown.

Fertilization

Very little information is available on the effects of forest fertilization on animal populations. It may be speculated however, that fertilization increases the palatability of certain plants, including Douglas-fir and various shrubs and forbs. However, fertilizer would be applied to the forest after herbicide application has destroyed much understory vegetation and/or after forest succession has progressed beyond the shurb/sapling stage. Therefore, the net effect of forest fertilization on terrestrial wildlife may be insignificant. Fertilization reduces the amount of time that is required for the managed forest to reach commercial age. It encourages tree growth and the advancement of later successional stages. The trees are harvested, however, before old-growth community structure has time to develop.

Fertilizer accumulations in runoff water may increase nitrogen levels in streams and ponds of the JSYU. Significant additions of nutrients may

accelerate eutrophication in some streams or ponds by increasing the growth of aquatic vegetation and increasing biochemical oxygen demand. These effects will be most obvious in stream pools or ponds, especially if streamside vegetation has been removed, allowing the water to warm.

Precommercial Thinning

Precommercial thinning, although it may open a young forest canopy, generally does not benefically impact deer and elk because the unremoved slashings impede movements. Therefore, the obstacle presented by slash accumulations prevents deer and elk from utilizing any forage increases which result from the thinnings. Cover access is also prevented by slash accumulations. Assuming that all the areas to be precommercially thinned would prevent deer and elk utilization, this practice would result in the removal of 14,200 acres of potential deer and elk hiding cover.

Conversely, birds and small mammals may increase their use of an area following precommercial thinning. Slash accumulations provide cover for them and any increases in forage production can be utilized.

Precommercial thinning, therefore, may be viewed as a beneficial practice for small mammals and birds. It is detrimental to larger herbivores only in that it may decrease their access to hiding cover. Forage quantity for large herbivores is generally lacking in unthinned young growth stands. Therefore, slash accumulations which prohibit access to increased forage abundance do not

represent an adverse impact to wildlife forage. Precommercial thinning should have no measurable impact on populations of aquatic animals.

Fire Exclusion/Suppression

The exclusion and/or suppression of fire reduces the potential amount of land that could be available for wildlife which prefer early successional stages. In other words, fire suppression has no direct impact on the current amount of early seral habitat. As previously discussed, a great diversity of wildlife prefer the early successional stages which result after the removal of forest canopy. This canopy removal not only occurs with logging but also with blow downs and wildfire. Complete fire suppression (if it were possible) would have the same effect on wildlife that cessation of timber harvest would: the potential land that would ordinarily be available as habitat would diminish. Because complete suppression is not a reality, fire suppression and control activities reduce the potential amount of early seral stage habitat that would otherwise be provided by periodic uncontrolled wildfire.

Conversely, fire suppression and/or control also help to preserve old-growth habitat. This will potentially benefit wildlife populations restricted to old-growth habitat on lands outside the commercial forest base. The beneficial aspects of fire suppression to animal populations, of course, depend on the uncertainty of fire occurrence (i.e., perhaps no fires would have occurred anyway).

Fire suppression or control will have only short-term effects on wildlife habitat within the commerical timber base. Logging disturbances, as previously described, will be sufficient to provide early successional stage habitat while mature forest habitat will be removed by logging operations.

Silvicultural Control of Insects and Disease

Silvicultural control involves the cutting and disposal of insect- or disease-infested trees left standing, many of these trees would provide the dead tree ("snag") habitat for future generations of dependent wildlife. There are approximately 40 species of wildlife indigenous to southwestern Oregon which are directly associated with the specialized habitat provided by snags. There is a natural succession of decay following the death of a tree. Because of these decay processes all dead trees must eventually fall, with or without forest management practices. The removal of dead or dying trees, although important from a silvicultural standpoint, eliminates these trees from succeeding populations of snags which would otherwise have replaced their fallen predecessors. If no new snag habitat becomes available, the implications to snag dependent wildlife are obvious. The northern spotted owl, a threatened species occurring in the JSYU, is dependent on snag habitat in old growth forests.

Silvicultural control techniques are designed to prevent major insect outbreaks. These techniques probably have little effect on residual insect populations. The major impact on insects is that the control techniques help

prevent the sporadic population fluctuations that occur during outbreak conditions. These outbreak conditions may be important to populations of woodpeckers and other insectivorous birds.

Silvicultural control practices should have no effect on aquatic invertebrates unless the logging methods used for the removal of infested trees are injurious to the watershed which, in turn, impacts aquatic habitat.

3.2.4.5 Animal Conclusions

The most significant impacts to terrestrial wildlife will be the elimination of old growth habitat and concomitant declines in populations of dependent species. Continued long-term forest management in the JSYU would not allow succession to replace lost old growth habitat.

Corollary to short-term declines and long term elimination of old growth habitat is a significant increase in early seral stage habitat. The short-term impact will be significantly favorable for may dependent small game and non-game populations but probably insignificant for large game populations. The significance of proposed herbicide treatment on animal populations is unknown.

Probably the most significant impact on aquatic animals is physical habitat alteration. This impact is impossible to quantify due to the non-site specificity of the proposed action and the unpredictability of sediment

deposition in streams. Nonetheless it is felt that the impact will be significant because timber harvesting is known to increase stream sediment loading and the majority of stream habitats in the JSYU are known to be currently in poor to fair condition with the amount of available habitat decreasing. It must be emphasized, however, that the rate of habitat decline would be lower with the proposed action than if the existing timber management plan were continued.

3.3 SOCIAL ENVIRONMENT

Some timber management activities increase success in or availability of certain recreation pursuits, such as hunting, berry-picking and other dispersed pursuits. Other timber management activities impair the quality of some recreational experiences, particularly those that are oriented toward appreciation of the natural beauty and solitude of the forest.

Forest recreationists and others in the vicinity of timber management activities would be adversely affected by associated noises. Although these noises are only temporary, they are often loud.

Many timber management activities change surface vegetation, disturb the soil or build roads or other facilities, creating contrasts to the contiguous environment. BLM's proposed land-use plan for the area requires that timber management activities be conducted so that visual impacts are minimized.

Prior to ground-disturbing activities, the BLM thoroughly surveys project areas to identify and evaluate all cultural resources within the area. Due to dense vegetation and accumulated forest duff, however, some archaeological sites would not be discovered before logging begins. In the course of road construction and logging, some unidentified archeological sites could be inadvertently damaged. Road construction would ease access to, and increase adverse impacts on, any paleontological, archeological and historical sites near the roads.

Socioeconomic impacts related to timber sales will not be fully realized for at least four to five years after a new allowable cut is approved, due to the three-year life of timber sale contracts then outstanding. Even after that time the impacts on national softwood supplies, lumber prices, and housing costs would be minor.

Compared to the timber-based employment projected for 1980, an employment reduction of more than 370 jobs would be expected to follow the proposed lower harvest level (270 jobs lower if compared with 1973-75 levels). In Josephine, Jackson and Douglas counties, the projected employment reductions would amount to less than one per cent of total employment. The decrease in aggregate personal income of resident workers and proprietors is projected to be 1.5 to 2.9 per cent in Josephine, and less than one per cent in Jackson and Douglas. Induced emigration from the three counties might be as much as 960 persons but probably would be markedly less.

If the proposal were implemented, annual public revenue for all O&C counties would be expected to decline about $3.3 million below that projected (based on current management) for 1980 based on recent stumpage prices. O&C payments dependent on the JSYU, however, would be about $4 million more than during 1973-75. Josephine County would receive some $400,000 less than projected under current management. To compensate for this reduction, Josephine County would need a property tax rate increase of 58 cents and; Douglas County, 45 cents per $1,000 assessed valuation. In view of the trend in

timber stumpage prices, however, a decline in O&C payments below recent levels is not expected.

Market instability and technology adjustments, however will cause recurrent short-term cyclical fluctuations in timberbased employment in excess of that attributable to the proposed reduction in timber sales from the JSYU.

3.3.1 Recreation

While some recreation seekers may benefit from timber management practices, others may be adversely affected. This section will analyze the beneficial and adverse impacts of logging systems and other activitites.

3.3.1.1 Silvicultural Practices

The creation of clearcut units within the forest will provide openings for wildlife which would benefit the hunter and photographer. Natural vegetation invading a clearcut unit would benefit the berry-picker. Areas for dispersed recreational use would be created as a result of clearcutting. Approximately 5,000 acres will be clearcut.

Outdoor recreationists seek not only activity but also esthetic, emotional, spiritual, and intellectual challenges (Anon., Journal of Forestry, 1968). Driver (1975) defines recreation as an experience, and recreation demand is defined in terms of preferences for specific satisfying experiences

that are desired, expected, and sought from the chosen activities. The recreationist that enjoys experiencing a pristine environment would be affected by areas where timber harvest is apparent. Worst case visitor-day reduction or percentage of population affected is examined later in this analysis.

Shelterwood cutting and commercial thinning would have less adverse effect than clearcutting upon recreationists who value appreciative uses of the natural environment. This category of recreationist participates in activities or enjoys knowing opportunities exist for the participation in activities directed toward appreciation and preservation of environmental features (i.e. seeing natural scenery on foot or horseback, climbing, birding, nature study, and photography). Alteration of the environment would not be as widespread or apparent. Shelterwood cutting and commercial thinning could also leave trails for hikers. Approximately 50,000 acres will be shelterwood cut, and about 4,700 acres will be subjected to commercial thinning.

3.3.1.2 Yarding and Loading

Yarding and loading alter the recreational experience by creating noise and odors. Tractor yarding has the potential for the most impact, and approximately 23 per cent of the proposed allowable cut will be tractor-yarded. Ground systems of yarding and loading could also produce areas for hiking as a result of the movement of felled timber over the ground's surface. Cable yarding of approximately 77 percent of the proposed allowable cut would create similar impacts to a lesser degree.

3.3.1.3 Road Construction, Renovation, Maintenance

The proposal calls for the construction of 500 miles of permanent road, affecting 4,400 acres. The creation of access to additional land would provide more opportunities for dispersed recreation. The construction of new roads may attract more people which would adversely impact resources in specific heavily-used areas. As existing facilities and the environment deteriorate, the quality of the recreational experience would be impaired. In many areas, however, new roads would serve to disperse recreationists and reduce the present level of impacts upon facilities and recreational experience.

Recreational use is projected to increase in proportion to the total number of future recreation users. A demand increase of 103 per cent has been indicated for camping, picknicking, fishing, and hunting between 1970 and 1990 (Oregon Statewide Outdoor Recreation Plan, 1972). Demand for other specific recreational activities is forecast to increase to a similar extent. These figures are based upon the assumption that present trends will continue. The degree of impact, would therefore increase commensurably as recreational use increases.

Extending the network of logging roads could possibly decrease recreational enjoyment by creating additional traffic, noise, dust, fumes, and decreased visibility. Also, the recreationist could easily find himself lost if new roads are not mapped and signed. Approximately 500 miles of new road affecting 4,400 acres will be constructed.

Perhaps the most significant impact of road construction is access to new areas for dispersed recreational opportunities. Roadless area users might also benefit by gaining quicker and greater ease of access to undeveloped area trailheads. In any case, as timber harvest and associated road construction create additional potential for dispersed recreation, the impacts of human waste disposal and ORV use will also become apparent. Litter, garbage, sink wastewater, and biological waste from humans and their pets will affect water quality and the recreational experience of others. The magnitude and seriousness of environmental, health, and esthetic impacts of waste disposal from dispersed recreation are not yet clear. The physical and biological consequences of increased dispersed recreation are further discussed in the sections dealing with impact on soil, water, plants and animals.

More dispersed recreation would cause increased fire hazard during times of peak use. The need for additional fire preventive measures, signing, and facility development may become apparent as recreational user patterns change.

Most timber management activities alter the recreational experience. Timber harvest and accompanying road construction, traffic, and noise severely impact recreational values. The impact of noise is dealt with separately in Section 3.3.4. Practically all timber management practices create evidence of human presence by disturbing previously undisturbed forest areas. Each year, approximately 50 per cent of the cutting, or 250 acres of clear-cut and 2,500 acres of partial cut will be new ground, previously undisturbed by man. The serenity and solitude afforded by a visit to an undeveloped forest area is

lost. A reduction in recreation visitor days may result from this deterioration of the recreational environment.

It can be generally stated that any activity adversely affecting the recreational experience will cause a reduction in the number of visitor days. In a study of the relative importance of selected "demand expectations" of four test groups of Michigan recreationists in 1971, Driver (1975) found that the desire to experience nature is valued highly by social campers and back country campers. The desire to experience nature was not as great for trail bikers. Table 3-17 summarizes similar study (Knopf 1972) of ten different recreation groups. Insofar as timber management activities limit recreationists from achieving that desired and expected consequence, impacts can be quantified. In the worst possible case (if all campers were to decide not to camp within the non-Rogue River portion of the JSYU because they believe the opportunity to experience nature would be foregone as a result of timber management operations) a loss of approximately 10,000 visitor days would accrue.

In 1975 about 52 per cent of the total population of Josephine County could be expected to participate in camping. It was found that 70.37 per cent participated in picknicking (Oregon State Parks, 1976). Recreational activities and their environments impacted by timber management activities could inherently impact in the worst case that percentage of the total population participating in those activities.

Table 3-17

Mean Scores of ten Different Test Groups of Michigan Recreationists to the Expected Consequence of Experiencing Nature.

Test Group	Importance of Experiencing Nature [1]
Backcountry campers	7.8
Backcountry hikers	7.6
Social campers	7.5
Trout fishermen	7.3
Picnickers	7.0
Warmwater fishermen	6.8
Sail boaters	6.2
Trail bikers	5.8
Golfers	5.0
Tennis players	2.7

1/ Responses were to a 9-point scale format on which extremely important was coded 9 and not at all important was coded 1.

Source: Knopf 1972, pp.111-113.

As timber management activities alter the recreational experience by limiting the opportunity to achieve the expected consequence of experiencing nature, different groups of recreationists will feel the impacts to a different degree.

Hendee, et al. (1971) systematically grouped a number of recreational activities into five conceptually linked categories. Each category was named according to the general type of motivation it fulfilled:

1. Appreciative-symbolic activities are directed toward appreciation and preservation of environmental features. For example, recreationists typically would experience nature on foot or on horseback rather than from a car or train. Activities would be preferred in settings where crowding and manmade facilities were not common. These would include seeing natural scenery on foot or on horseback, rock climbing, mountain climbing, birding, nature study, and photography.

2. Extractive-symbolic activities are characterized by the quest for "trophies" extracted from the natural environment - fishing, hunting, and rock and shell collecting.

3. Passive free-play activities would require relatively little physical effort. The setting for them would not necessarily be natural or near-natural. Levels of use could be moderate to high. Considerable latitude would be possible for developing convenience facilities and opportunities for social interaction among participants. Activities include relaxing, sunbathing, reading, sightseeing from the car, and quiet boating or canoeing.

4. Social learning. This category includes activities in which major motivation is to socialize. Because social interaction is a principal source of satisfaction, relatively high levels of use and manmade facilities often are common. A high degree of naturalness of the environment is not required. Two classes of activities can be identified: (1) Social activities, such as visiting with others, and (2) learning activities in groups, such as visiting exhibits and hearing nature talks.

5. Active-expressive. These are activities where the emphasis is on physically strenuous activity for its own sake. Thus, a natural or natural-appearing setting is not required. Social interaction

is a major source of satisfaction and manmade facilities often are common. Activities include motorcycle riding, water skiing, downhill snow skiing, swimming, boat racing, snowmobiling, and playing outdoor games.

These researchers point out that passive free-play, social learning, and active-expressive activities do not require natural or nearnatural settings. Timber management activities will therefore result in impacts primarily to the recreational setting enjoyed by persons participating in appreciative-symbolic and extractive-symbolic activities. Within Josephine County the percentage of the population that participates in these types of activities follows:

Appreciative-Symbolic

1.	Hiking (to see natural scenery)	29.36
2.	Horseback Riding (to see natural scenery)	6.61
3.	Rock Climbing	no data
4.	Mountain Climbing	no data
5.	Nature Study	no data
6.	Photography	no data

Extractive-Symbolic

1.	Fishing	41.17
2.	Hunting	19.57
3.	Collecting	no data

Source: Oregon State Parks and Recreation Branch, 1976.

An unreported 1971 study of Michigan state park campers by S. Ross Tocher shows how married and unmarried campers valued specific expected consequences. Both single and married campers highly valued the expected consequences of enjoying the natural surroundings and experiencing peace and tranquility. Timber management operations could inherently impact both types of campers.

Another study in 1971 (Bassett, et al., 1972) quantified individual expected consequences of 593 trout fishermen, 834 canoeists, and 255 cottage owners and riverside residents who were using Michigan's Au Sable River. Of the specific consequences listed, the following expected consequences were valued as extremely or very important by respondents (see Table 3-18). These expected consequences would be impacted by timber mangement operations in the JSYU. This analysis, of course, assumes that the expected consequences and desired experiences of Michigan recreationists are comparable to those of recreationists within the JSYU.

At this level of aggregation, the fishermen and canoeists display similar values. For the sake of quantifying possible worst case visitor-day reduction only data on fishing within the JSYU is available. We could also assume further visitor-day reductions as the desired experiences are adversely affected by timber management activities.

A number of studies focus rather clearly on the desired consequences expected from specific activities. Driver (1975) lists a number of

Table 3- 18

Derivation of Worst Case Approximate Visitor-Day Reduction as a Result of Timber Management Operations Impacting Selected Expected Consequences of Fishermen

Expected Consequences	a. Percentage of Respondents Checking Extremely or Very Important Response [1]	b. Total Annual Visitor-Days Within JSYU [2]	c. Worst Case Approximate Visitor-Day Reduction as a Result of Timber Management Operations Impacting This Desired Experience (a x b)
1. To enjoy the out-of-doors			
fishermen	80	12,100	9,680
residents-cottage owners	87	nd	nd
2. Restful environment			
fishermen	79	12,100	8,107
residents-cottage owners	73	nd	nd
4. Breathe fresh air			
fishermen	65	12,100	7,865
resident-cottage owners	84	nd	nd
5. Escape city noise			
fishermen	62	12,100	7,502
resident-cottage owners	82	nd	nd

1 Source: Bassett, et al., 1972.

2 Source: Medford District Office, BLM.

studies examining the preferences of campers, canoeists, fishermen, hikers, hunters, snowmobilers, and participants in several activities. To the extent that timber management activities prevent the achievement of desired consequences and experiences, visitor-day reductions will result.

Fishing success and watersports could be adversely affected as a result of siltation, eutrophication, fish barrier construction, and changes in water quality which would result from some timber management practices and some road construction. Table 3-10 shows that the majority of timber management treatments will cause an increase in the amount of suspended sediments. According to a study near Green Bay (Ditton, Goodale, 1972), a larger proportion of swimmers indicate a willingness to substitute newly cleaned-up waterways (86.3 per cent) than fisherman (79.7 per cent) or boaters (63.4 per cent). These findings were based upon a 1 per cent change in water quality. This study indicates that recreationists participating in water contact sports and swimming will be more adversely affected than fishermen or boaters, respectively. Logging debris entering waterways will further increase this impact. This analysis, of course, assumes a similarity in values held by Wisconsin and Oregon recreationists.

As turbidity increases above 25 ppm, fishing success declines. (Phillips, 1971). This would result in a loss of sport fishing activity. It has also been shown that a hypothetical 10 per cent increase in salmon angling success would induce a long-run increase in fishing activity of ten per cent. Bottom fish angling activity is considerably less responsive to changes in success

(Stevens, J.B., 1966). Changes in fishing success and sports fishery recreational values would have negligible impact on the local economy. A discussion of the impact of timber management operations upon water quality and quantity can be found in the aquatics section. The impact of water quality degradation upon fish populations is examined in section 3.2.4.

It was discussed earlier in this analysis how certain logging systems and road construction may create areas for dispersed recreation. It is also possible for some potential recreation sites (dispersed or developed) not yet identified or small tracts with primitive or roadless characteristics to be destroyed as a result of some timber harvests and subsequent activities. Each year, approximately 50 per cent of the cutting, or 250 acres of clearcut and 2,500 acres of partial cut will be on new ground, previously undisturbed by man.

A discussion of the impacts of the proposed action to potential wilderness areas can be found in Section 3.4.

Many timber management practices create conditions hazardous to recreationists. The application of fertilizer, and herbicides, tree falling, blasting, leaving cull material, burning, and traffic associated with timber management operations would create dangerous situations for recreationists. Fertilizer will be applied on 22,300 acres. About 34,500 acres will be subjected to herbicide site preparation. Herbicides will be used for stand release on approximately 13,200 acres. Slash will be burned on about 10,100

acres. Some practices would eliminate hazardous conditions, however. Improved roads and the removal of dead trees would provide a safer environment for recreational pursuits. One hundred miles of existing road will be reconstructed. About 50 miles of existing road will be surfaced.

3.3.1.4 Conclusions

The impacts of timber management activities upon the recreation resource would be most significant to recreationists that desire, expect, and seek to experience a pristine environment. This category of recreationist participates in activities or enjoys knowing opportunities exist for the participation in activities directed toward appreciation and preservation of environmental features (i.e. seeing natural scenery, climbing, birding, nature study, photography).

The impacts of timber management operations would be meaningful to all recreationsists as the quality of recreational experience is impaired. In many cases, timber management activities would result in additional areas for the pursuit of certain recreational activities (i.e.: dispersed activities, hunting, berrypicking, photolgraphy). Some areas may be more accessible as a result of timber management operations and may benefit certain categories of recreationists (i.e.: dispersed area or backcountry users).

3.3.2 Cultural Resources

Eight archeological sites have been identified within the boundaries of the Josephine SYU (Table 2-32). In section 2.1.3.2, archeological sites have only been assigned township and range location. This measure will prevent vandalism on these sites as a result of this information being disclosed in this public document. Locations of historical sites are shown in Figure 2-25. While there are no specific sites of paleontologic interest, fossils have been known to occur throughout the unit. Complete surveys of the Josephine SYU to identify paleontologic and archeologic sites have not been undertaken. However, each proposed ground-disturbing activity would be preceded by a complete survey of cultural resources as part of the environmental assessment reports which precede each site-specific timber sale, and protection would be provided as necessary.

The major types of local direct impacts associated with each timber harvest activity fall into three main categories:

1. Compaction of soil or sediment.
2. Physical disturbance of the ground surface.
3. Alteration of chemical properties of mineral soil by fire, chemical treatment, or addition of organic matter.

Compaction and physical disturbance usually occur during harvest. Chemical alteration usually occurs after harvest activities are complete, during slash disposal and site preparation.

Indirect impacts usually are seen after the harvest cycle is complete, and may occur both within and outside the immediate cut unit.

A further discussion of these direct and indirect impacts can be found in Section 3.1.3.

All timber management practices which disrupt the ground surface would serve to locate and at the same time possibly destroy previously undisturbed pristine sites and objects. Both surface lithic sites and sites with structures or subsurface components would be damaged, though the extent of damage to a site with subsurface components would be less. Although data is not available to quantify impacts, we could expect ground-disturbance to cause extensive artifact displacement, loss, breakage, and churning. The potential area of soil disturbance and compaction as a result of cutting practices is summarized in Table 3-12. In addition to partial or total resource destruction, timber management activities would also alter the context of archeological resources and affect the preservation of data. Some activities such as landfilling or inundation could also significantly obstruct access. It is not possible to estimate the number of currently unidentified sites that would be lost as a result of timber management activities.

The quantification of impacts to unidentified archaeological sites is not possible. Archaeological sites would have to be examined on a site-by-site basis to determine how much impact would constitute an adverse effect. For example, on some sites, 0.7 per cent severe surface disturbance would be

intolerable; on others, perhaps 100 per cent severe surface disturbance would not constitute an adverse effect, because the archaeological values are confined to subsurface deposits (Wildesen, 1977). The degree and extent of impacts are also variable, depending on the choice of felling, bucking, yarding, slash disposal, and development techniques. In most cases, duration of impacts would be permanent, because neither broken lithic materials nor their original surface distribution can be restored once altered.

Construction of roads would provide ready access to archeological and paleontological sites, resulting in increased traffic and the possibility of partial or total loss. Visitation to these unique sites would result in vandalism, looting, site damage, and site erosion. The esthetic, recreational, interpretive, and educational benefits of the sites would be lost.

Table 2-33 lists 41 identified historical sites that could be impacted by some aspect of the proposed action. Three of these sites are currently on the National Register of Historic Sites. The Grave Creek Covered Bridge has been approved by the State Historic Preservation Office for nomination to the National Register in the near future. The bridge is included in a thematic group of 56 covered bridges throughout Oregon pending nomination to the Register. Sites on the National Register, nominated to the National Register, or eligible for nomination will be fully protected. It is likely that other sites will be identified as having significant historical interest. It is possible that in the future other sites will be nominated for inclusion on the National Register. Prior to any ground-disturbing project, a thorough

survey would be made to identify sites of significant historical interest. Protection of these sites would then become a priority. Approximately 2,500 acres will be subjected to Class III Intensive Field Inventories designed to identify and evaluate, from surface and exposed profile indications, all cultural resources within the site specific project areas.

A major impact of logging systems would be alteration of the landscape and vegetation near the historical sites. This disturbance of the sites' visual setting would reduce the esthetic, recreational, interpretive, and educational potential.

Some people might consider old growth trees a type of "living history." According to the 1977 inventory of the Josephine SYU, 46 per cent of the commercial forest in the unit is at least 200 years old. Cutting this old growth timber could, in a sense, be construed as destruction of historical values.

Road construction and improvements would provide easier access to historical sites and open them to vandalism and partial or total destruction. The timber management proposal calls for the construction of 500 miles of permanent road that would take 4,400 acres. About 100 miles of existing road will be reconstructed, and 50 miles of existing road will be surfaced.

Ground-disturbing activities which accompany timber management may severely impact unidentified historical resources. Old wagon trails and other historical features could inadvertently be destroyed.

Timber management operations which disrupt the ground surface would result in some artifact displacement, loss, breakage, or churning at currently unidentified cultural sites. In some cases, the impacts to unidentified sites may be significant depending upon the amount of impact which would constitute an adverse effect on the site. Thorough surveys prior to ground-disturbing activities will make it highly unlikely that significant impacts will occur to currently unidentified sites.

In some cases, the alteration of a cultural site's visual setting may significantly reduce the esthetic, recreational, interpretive, and/or educational potential of the site. The cutting of old growth trees would significantly impact those that appreciate the "living history" values of old growth timber.

Vandalism and partial or total destruction of cultural resources as a result of site identification and accessibility may be significant in some cases.

3.3.3 Visual Resources

Most timber management practices change surface vegetation and create contrasts to the existing environment. Timber management and subsequent activities mày produce beneficial or adverse short-term or long-term alterations of the landscape.

Virtually all timber management activities create evidence of human presence by disturbing previously undisturbed areas. It is estimated that approximately 50 per cent of the cutting, or 250 acres of clearcut and 2,500 acres of partial cut will be on new ground, previously undisturbed by man. These areas will be especially prone to the creation of contrasts.

Some timber management activities bring about changes in atmospheric conditions which may be visually or esthetically objectionable. Fumes and dust from slash-burning not only impair visibility but create conditions hazardous to humans. Section 2.1.1.2 dealing with impacts of the proposed action upon air quality further examines the effects of timber management operations upon visibility (Table 3-2). That section concludes that dispersive air conditions, accompanied by cloudy conditions, with low visibility, would make the impacts of slash burning to visibility inconsequential.

As the number of recreationists and viewers increase, the visual impacts of a management activity increase also. A demand increase of 103 per cent for pleasure driving and sightseeing is anticipated between 1970 and 1990 (Oregon

Statewide Comprehensive Outdoor Recreation Plan, 1972 Supplement). The extent of impacts upon visual resources can therefore be projected to increase in direct relation to increased future pleasure driving and sightseeing demands. Additionally, should attitudes or tastes change and viewers decide to prolong the duration of their viewing, the visual impacts of a management activity also increase.

3.3.3.1 Silvicultural Practices

Within the JSYU, there is little natural variation or enforced pattern into which visual impacts can be absorbed. Simple and uniform textured vegetation is highly vulnerable to impacts of disruption. For this reason, clearcutting will create strongly contrasting geometric forms and vegetative texture groupings. Approximately 5,000 acres will be clearcut. The juxtaposition of clearcut units and forested landscape would produce long-term impacts upon the visual resource. As a beneficial impact for recreationists, clearcuts would provide areas suitable for viewing wildlife.

The falling of merchantable timber through a two-stage shelterwood cutting system would also result in long-term alterations of landscape character. The first stage of a shelterwood cut would not impact the visual resource as drastically as clearcutting would. Upon completion of the second stage of the two-stage cut after a 5-year time lag, impacts upon the visual resource will be comparable to those resulting from clearcutting. Approximately 50,000 acres will be harvested through a two-stage shelterwood system.

Thinning operations would tend to produce short-term impacts upon the visual resource. Precommercial thinning will be done on about 14,200 acres. About 4,700 acres will be subjected to commercial thinning. In many cases, such timber management practices as thinning could be effectively used to enhance the environment by changing form, line, texture, color, and vegetative groupings. These long-term enhancements may result in incidental short-term adverse impacts.

At the Petawawa Forest Experiment Station in Canada, a numerical index has recently been developed to quantify the esthetic impact of forest management practices such as logging (Methven, 1974). This index could be most helpful in quantifying the impacts of silvicultural and other forest management practices in specific landscapes. The index is based on six esthetic variables--species diversity, structural complexity, forest view, slash visibility, pattern, and boundary form. The methods used to measure these esthetic variables are based upon a number of guidelines and assumptions, relevant to this discussion of the esthetic effect of forest management alternatives in quantitative terms. Those assumptions and guidelines include the following (Methven, 1974):

1) That species diversity measures both the variety or richness of the vegetation plus the relative abundances of the constituent species.
2) That structural complexity is composed of two components; vertical stratification and age structure.

3) That forest view is essentially a measure of visual penetrability and this its value is a function of the density of the vegetation. The basic assumption is that esthetic value is proportional to the depth of view.

4) That the most obvious and generally negative consequence of most harvesting methods are unsightly accumulations of logging slash over the treated area.

5) That only slash which is easily visible or constitutes an obstruction to free movement is considered esthetically objectionable since material lying on the ground or close to it is shielded from view by minor vegetation easy to step over and subject to rapid decomposition.

6) That pattern is a two-alternative (i.e. uniformity vs. non-uniformity) variable composed of two components: uniformity of pattern and regularity of spacing.

7) That straight boundaries and roads are considered esthetically negative while naturalistic boundaries which follow original stand boundaries of physiographic features are considered positive.

Such an index could be used to compare the impacts of different timber management practices in site-specific areas. That level of analysis will be carried out in the site-specific EARs.

3.3.3.2 Yarding/Loading

Vehicle operation associated with yarding and loading would produce short-term alterations of landscape character. Vehicle operation could result in

long-term landscape alterations and inherent adverse impact upon the visual resource. These impacts would be mainly disturbance of soil and surface vegetation. About 23 per cent of the proposed allowable cut will be tractor yarded. Soils within the upland timber characteristic landscape are highly reflective of light when disturbed and are especially prone to adverse impact.

There is considerable variation in the degree and extent of soil and vegetative disturbance for different yarding systems. When percentage of severe disturbance is plotted by yarding system type, it becomes apparent that ground support systems tend to result in greater areas of severe disturbance of sediments per total area logged than do aerial support systems (including skyline). This topic is further examined and quantified in the discussion of impacts upon soil and vegetation.

3.3.3.3 Road Construction

Blasting, excavation, and road construction would result in long term landscape alterations. The construction of 500 miles of road will affect 4,400 acres. Due to soil colors in many areas of the Josephine SYU, road construction would create strong contrasts. Road construction and maintenance could benefit the visual resource by providing scenic access, panoramic views, and by focusing attention on specific scenic features.

3.3.3.4 Development and Protection Practices

Burning, fertilization, and herbicide application would produce both short-term and long-term alterations of the landscape. Development and protection practices primarily result in long-term enhancement and short-term adverse impacts upon the visual resource. Scarification would result in short-term disturbances of surface vegetation and soil. Mechanical scarification will affect 160 acres. Fertilizers could be used to rehabilitate areas denuded by fire, flood, avalanche, or disease. The short-term impacts of fertilization are related to vegetative reestablishment, growth, and protection. These impacts benefit the visual resource by decreasing vegetative contrast. The effects of a single application of fertilizer on annual growth can usually be continuously recorded over a ten year period. About 22,300 acres will be fertilized. The application of herbicides would control herbaceous or woody vegetation prior to or following seeding or planting. The dead vegetation resulting from chemical weed and brush control creates highly visible effects. Herbicide site preparation will affect about 34,500 acres. Stand release by use of herbicides will affect 13,200 acres. Slash disposal will be apparent on about 43,600 acres.

The degree to which a management activity adversely impacts the visual quality of the landscape depends upon the amount of visual contrast that is created between the activity and the existing landscape character. The amount of contrast between a proposed activity and the existing landscape character can be measured by separating the landscape into its major features (land and

water surface, vegetation, and structures), and then predicting the magnitude of change in contrast of each of the basic elements (form, line, color, and texture) for each of the features. Studies evaluating the esthetic dimension of harvested areas in Wyoming and Montana agree with intuition that as the amount of downed wood or the evidence of man's activity increases, forest scenes are less liked by observers (Schweitzer, et.al., 1976).

Certain areas of the landscape are more sensitive to impacts than others. Where dissimilar materials meet (sky meeting forest or conifers meeting hardwoods, for example), the landscape is particularly vulnerable to disruption. Impacts at higher locations are usually more apparent than those lower in the landscape. The higher the location, the more extensive both the area and the distance from which it can be seen. On steepening slopes, a typical impact such as road construction will occupy increasing amounts of transverse area. On steep slopes visual vulnerability is greater (Litton, R. B., 1974).

Contrast rating is applied to all proposed land management activities which disturb the soil, change or remove vegetation, or place a structure in the landscape. It is applied to all areas needing rehabilitation or enhancement. The EARs will deal with the application of the contrast rating system to specific timber sales.

Assessing the amount of contrast for a proposed activity can give a good indication of the severity of impact and serve as a guide in determining what

is required to reduce the contrast to the point where it will meet the criteria for the visual resource management classes of the area (BLM Manual, Visual Resource Management, 6300). Visual Resource Management classes for the Josephine SYU are specified and discussed in Appendix C. Approximate acreages of high intensity management lands within each VRM class is as follows:

VRM Class	Approximate High Intensity Acreage	Approximate Percent of High Intensity Land
I	9,847	4
II	3,424	2
III	30,125	14
IV	179,500	81
Total	222,896	100

The impacts of timber management activities upon VRM Class I lands would be nonexistent as timber harvest is not allowed on such lands. The impacts of timber management activities upon VRM Class II, III, or IV land could be insignificant, moderate, or severe, depending upon amount of contrast created. Where the impact is either moderate or severe, the contrast rating scores will be used to determine the most effective means of mitigating the impact, with the idea in mind of making the proposed project meet the VRM class requirements of the area.

As only about 2 per cent of the high intensity lands are classified as VRM Class 2, impacts within this class will be virtually nonexistent. There is a slightly greater chance of adverse impacts occurring in VRM Class 3 where

14 per cent of the high intensity land is located. Should adverse impacts occur the majority of them will be within VRM Class 4 lands as 81 per cent of the high intensity land has been designated as VRM Class 4. Appendix C examines characteristics and management concerns for each of the VRM classes.

3.3.3.5 Conclusions

Timber management operations create visual contrast. The most significant contrasts are long-term alterations of the environment. Silvacultural practices, vehicle operation associated with yarding and loading, and blasting, excavation, and road construction will create significant impacts. Short-term visual resource alterations also create contrasts. Slash burning and traffic, thinning operations, vehicle operation associated with yarding and loading, and development/protection practices will create significant impacts in the short-term.

The BLM's contrast rating system will be applied to each specific timber sale to assess the severity of impact of the proposed activity. The most effective means of mitigating the impact will be determined, and the BLM will attempt to make the proposed project meet the VRM class requirements of the area.

Impacts upon VRM Class 1 lands would be non-existent as timber harvest is not allowed on such lands. Impacts to VRM class 2 lands would be virtually non-existent as only about 2 per cent of the high intensity timber management

lands are classified as VRM Class 2. Impacts would be most saignificant upon VRM Class 3 and Class 4 lands where 14 per cent and 81 per cent, respectively, of the high intrensity land is located.

3.3.4 Noise

Virtually all timber management activities create noise. Studies have shown that recreationists differ in their desire for solitude and seclusion (Hendee et.al. 1968, Stankey 1973). Wilderness purists prefer serenity and solitude more strongly than do visitors to more accessible locations. In relatively inaccessible areas of the Josephine SYU, any noise suggesting human activity would have a negative, annoying, or intrusive connotation. In this case, physical properties do not account for the annoyance. Rather, it is the fact that the noise merely signifies the presence of unwanted and unexpected people.

A study by Harrison (1974) identified eleven sources of sound which intrude upon the wilderness experience. According to the opinion of some forest officers, seven were considered less intrusive (USDA-Forest Service 1969):

1. Sawing with a two-man saw.
2. Chopping with an axe.
3. Using a pick or shovel or both.
4. Rock drill and sledge.

5. Firearms (.22 caliber pistol and 30.06 rifle).

6. Man shouting as loudly as possible.

7. Two trail crews working with hand tools.

The four most intrusive sounds were identified as:

1. Dodge pickup truck, 1966 V8

2. Motorcycle, 350-cc "Velocette."

3. Small, high-speed, 2-stroke engine, McCulloch portable welder.

4. Chainsaw, Wright model 30.

The more intrusive a sound is, the greater its degree of impact upon forest visitors.

When the desire and expectation for solitude is not so great, noise intrusiveness and impact may be more dependent on physical properties, intensity, frequency, and intermittent recurrence (Dailey and Redman, 1975). Impacts can also be decreased by visually screening the noise source. Impacts would increase if noise sources were visible, even if beyond earshot.

Timber management activities would have substantial auditory impacts. While only temporary noise sources, motorized vehicles and equipment would greatly impact the quality of the forest experience. Harrison (1974) has found that in a forest a motorcycle becomes just audible at distances ranging from 1,400 feet to 3,900 feet from the receiver, depending on vehicle size.

In the average situation, a chainsaw can be heard to a distance of 1.43 miles with a standard deviation of half a mile. By extrapolating levels measured at shorter distances, it was found that chainsaw noise is just inaudible when it is 15dB below the ambient noise level (dBA). Similarly, skidder noise could be heard to a distance 1.45 miles ± .75 miles. At these distances skidder noise is below the ambient noise by 10dB with A-weighting (see Figures 3-7 and 3-8). Assuming that noise levels have a normal distribution, both chainsaws and skidders should be inaudible 50 per cent of the time at 1.5 miles. Chainsaws should be inaudible 85 per cent of the time at two miles, skidders inaudible 85 per cent of the time at two miles, skidders inaudible 85 per cent of the time at 2.2 miles. Natural masking noises would have to be at a very low level for these machines to be heard at 2.0 and 2.2 miles, respectively (D.V. Myles, 1971).

To eliminate acoustic annoyances by completely muffling or submerging them in background noise, the sound pressure level caused by forestry equipment must be reduced to about 15 dB below the prevailing background noise. An example with a sound level of 100 dB at 50 feet is a poorly muffled chainsaw. Under normal forest conditions, the saw would have to be more than one mile from the receiver to be completely inaudible. Certain topography or atmospheric conditions could easily quadruple this distance (Harrison, 1974).

Within areas of the Josephine SYU, differing background noise levels and attenuating factors would result in varying degrees of impacts and require different spacing requirements to control noise intrusiveness. Furthermore,

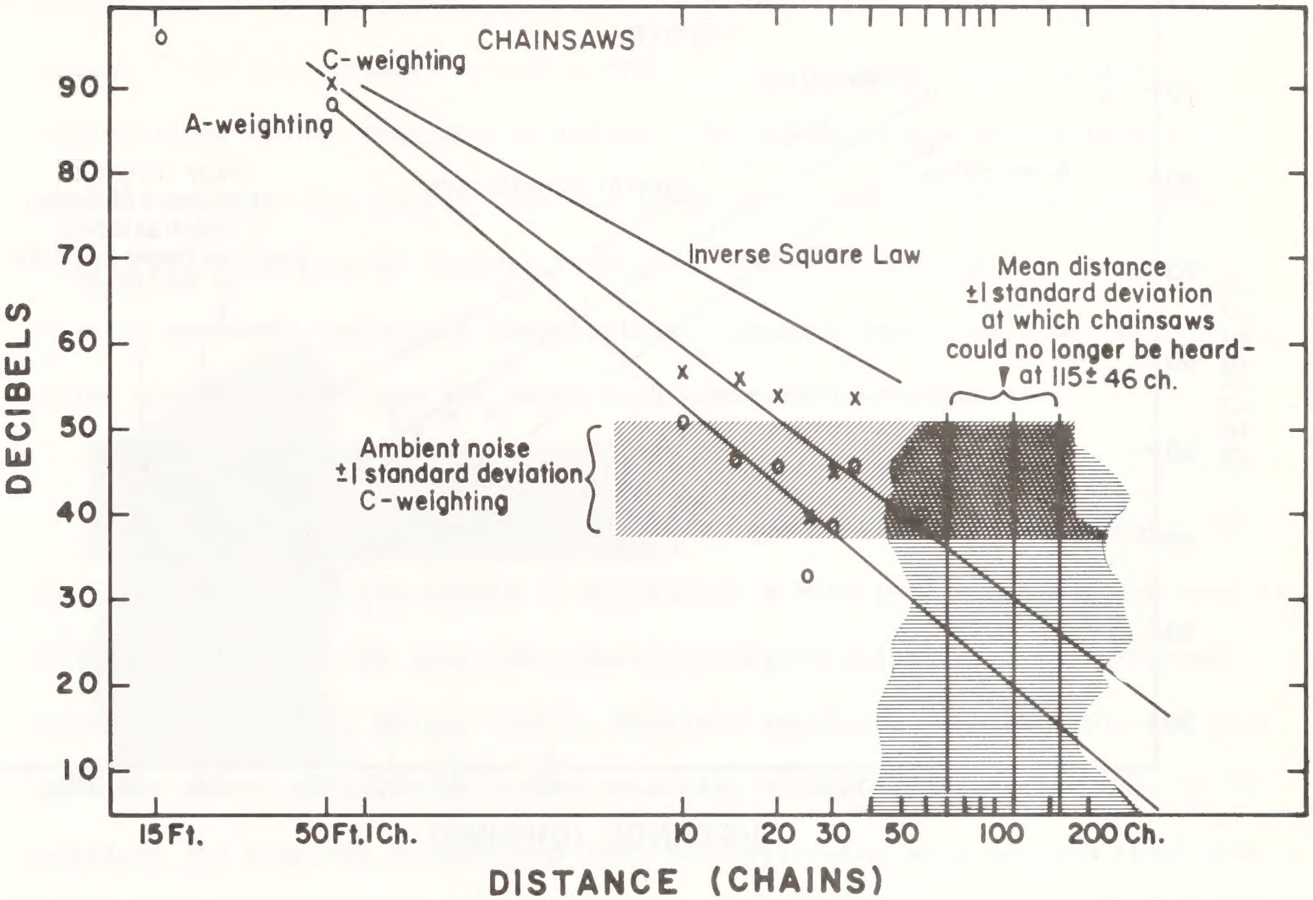


Figure 3-7 DISTANCES FROM NOISE SOURCES OF INAUDIBILITY FOR CHAINSAWS VERSUS AMBIENT NOISE LEVEL

SOURCE: Myles, et. al., 1971

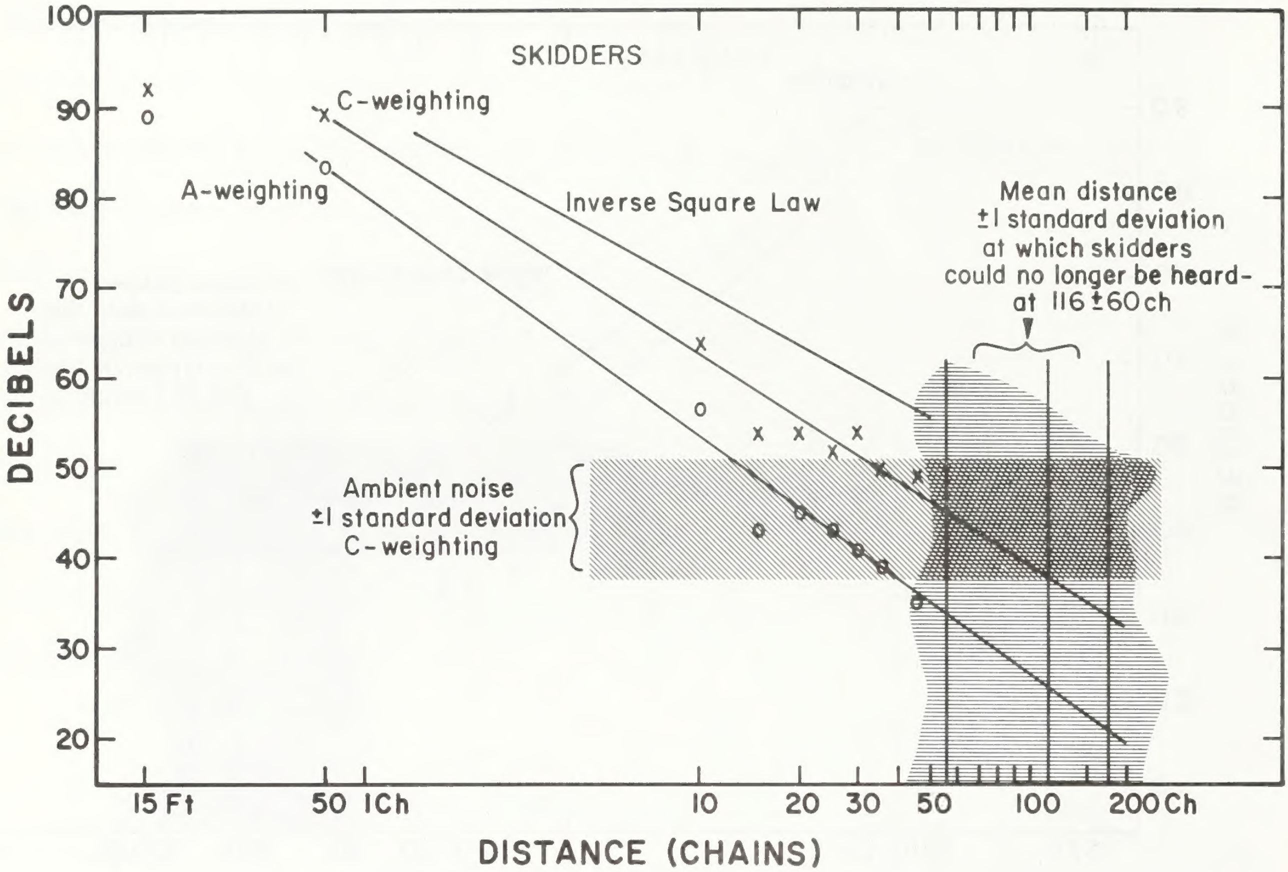


Figure 3-8 DISTANCES FROM NOISE SOURCES OF INAUDIBILITY FOR SKIDDERS VERSUS AMBIENT NOISE LEVEL

SOURCE: Myles, et. al., 1971

the impacts and control of intrusive noise from timber management would depend upon the desired quality of forest experience to be maintained. Dailey and Redman (1975) examined and quantified noise for three different forest situations (pristine, primitive, and portal), each dependent upon visitors' expectations of solitude and isolation. Forest users are most affected by a sound's connotation, rather than its level or duration (Parry and Stephens, 1969). Perhaps greater tolerance criteria could be established for noises that do not hold unpleasant connotations. Impacts resulting from this type of noise would be less than for noise with unpleasant connotations.

Another noise criterion has been established for wilderness areas. It has been found that the rumble of traffic on a busy road a mile or two away is 45 dB. This figure is also the commonly accepted noise level for suburban sleeping areas (D.V. Myles, 1971). Harrison concludes that probably the most sensible course would be to select something between the approximately 20 dB required for complete silence and the 45dB delineated as a maximum (Harrison, 1974). Again, visitor's expectations of solitude and serenity would have to be taken into consideration. Furthermore, the proximity of noise-sensitive properties (motels, residences, for example) would have to be considered when determining degree of impacts and methods for control of noise intrusiveness.

Noise level data specific to timber management activities on the Josephine SYU is not available. In the Canadian Forestry Service study, the average effects of topography, forest cover and weather were incorporated in the

results. These average effects are representative for those parts of eastern Ontario and western Quebec where the measurements were made, but they may not be applicable under different conditions. While environmental conditions may be different, machines used are essentially the same. In any case, the study provides a firm technical basis to justify a criterion level increased by at least 5 dB to establish a point at which mechanized logging operation noise would still be acceptable to other forest users. Assuming such an increase, the study concludes that, in order to produce little or no auditory impact, logging operations should not be permitted closer than a mile from the arbitrary location (D.V. Myles, et al., 1971).

Intrusive sound will have significant impacts upon forest visitors for the duration of the noise. Intrusive noise created by timber management activities will most significantly impact those forest visitors with high expectations for solitude or isolation. Noise with unpleasant connotations create the most significant impacts in this case. When the desire and expectation for solitude is not so great, noise intrusiveness and impact may be more dependent on the physical properties, intensity, frequency, and intermittent recurrence of the noise.

3.3.5 Socioeconomic Conditions

The majority of effects on socioeconomic variables result from changes in the amount of timber logged, hauled and locally processed into primary wood products such as lumber, veneer and plywood (Timber Harvest Impacts). Most

details in Table 3-19 address the effect of changes in timber harvest. In addition, intensive forest development practices will have some effects on the local economy through "forest management jobs" as indicated in the same table.

The base against which impacts are measured is the projected situation without proposed changes in timber management (Existing Timber Management - Projected 1980, Table 3-19). To assist understanding of changes based on recent experience, a column in Table 3-19 presents effect of timber management in the recent past in the JSYU. The column is labeled Existing Timber Management - Recent Past 1973-75.

Under the proposed timber management plan, both a first decade and long term view are presented. The column under Existing Timber Management - Projected 1980 is the "projected without" situation, short term. Under Proposed Timber Management, the column entitled First Decade is the projected situation with the proposed action, short term.

Comparisons involving other columns will reflect projected changes in: employment/timber processed ratios; total employment; timber supply from other sources; stumpage prices; assessed valuation of taxable property; and impacts resulting from changes in timber management. Isolation of the impact of changes in JSYU timber management only is provided by comparing estimates representing the same time period. For example, when data on the status of economic variables for 1980 projected under current management are compared with those for short-term (first decade), the projected differences are

Table 3-19

Effect of Timber Management in the JSYU Upon Selected Economic Variables Under Current Management (1973-75 and 1980 projected) and Proposed Management (Long-Term Equilibrium and Short-term)[1]

Economic Variable	Units		Current Management		Proposed Management		Comparison of Proposed to Current Management[4]	
		1973-4-5	Short-Term	Long-Term	Short-Term	Long-Term	Short-Term % Change	Long-Term % Change
Timber Supply								
Annual BLM Timber Sales (JSYU)	(MMbf)	126	146	87	106	94	-27%	+ 8%
All Sources (Timbershed)	(MMbf)	555	609	557	580	562	- 5%	+ 1%
Employment (Direct)								
Timber	(Jobs)	885	957	501	695	541	-27%	+ 8%
Forest Development[2]	(Jobs)	42	7	7	42	42	+500%	+500%
Total	(Jobs)	889	964	508	737	583	-24%	+ 15%
Non-Local	(Jobs)	101	93	50	67	54	-28%	+ 8%
Employment (Direct & Indirect)								
Josephine Co.	(Jobs)	728	791	419	631	506	-20%	+ 21%
Percent Total for Josephine Co.	(Percent)	4.8%	4.4%	2.0%	3.5%	2.4%	-20%	+ 21%
Total Local	(Jobs)	1,316	1,427	752	1,091	863	-24%	+ 15%
All Jobs (Local & Non-Local)	(Jobs)	1,465	1,564	826	1,190	943	-24%	+ 14%
Local Personal Income (1974 $)	($1,000,000)	23.6	27.4	16.4	20.5	18.2	-25%	+ 11%
Public Finance (O&C Payments)								
JSYU Dependent O&C Payments								
O&C Area	($1,000,000)	4.9	11.2	8.9	8.2	9.6	-27%	+ 8%
S.W. Oregon	"	3.0	7.0	5.5	5.1	6.0	"	"
Josephine Co. Area	"	0.6	1.4	1.1	1.0	1.2	"	"
Douglas Co. Area	"	1.2	2.8	2.2	2.0	2.4	"	"
Tax Rate Equivalence of O&C Payment								
O&C Area	($/$1,000 T.C.V.[3])	0.20	0.32	0.25	0.23	0.27	-27%	+ 8%
S.W. Oregon	"	0.78	1.28	1.01	0.93	1.09	"	"
Josephine Co. Area	"	1.25	1.93	1.53	1.43	1.65	"	"
Douglas Co. Area	"	0.90	1.53	1.21	1.11	1.31	"	"

1 Long-term equilibrium is based upon planned harvest during the second decade and projections of economic parameters to 1990.
2 Forest Development practices are based upon those actually conducted during the FY 72 through FY 77 period.
3 T.C.V. represents the assessed true cash value of taxable property.
4 Comparisons were calculated as follows for each variable: 100(Proposed Mgmt. - Current Mgmt.)/(Current Mgmt.)
Note: Consult the introduction to this section for key parameters used, and for an interpretation of the Economic Variables.

attributable solely to proposed changes initiated by the BLM in management of timber in the JSYU. Comparison of the 1973-4-5 situation with either of the columns of Table 3-19 under Proposed Management would show changes resulting from: price changes; technology changes; population increases; and changes in assessed valuation of property, in addition to effects of changes in timber sales and forest development practices.

The columns under Current Management illustrate, mostly, the effect of expected changes in factors outside control of the BLM. However if labor requirement had remained constant, the direct JSYU timber based employment would have been 1,166 rather than 957 in 1980. The following text is provided to aid interpretation of the economic variables listed as row headings in Tables 3-19, 8-2 and 8-3. Long-term equilibrium is defined as beginning at the point in time beyond which the graph of allowable cut neither rises nor falls. It is based upon planned harvest during the second decade for the proposal. Short-term harvest during the second decade for the proposal. Short-term is during the first decade after announcement of the ten-year allowable cut in parameters used are based, for long-term on 1990, for short-term, 1980.

Under the heading "Timber Supply", Annual BLM Timber Sales (JSYU) is the amount of timber, in millions of board feet Scribner, to be sold annually from public land in the JSYU. The subcategory, All Sources (Timbershed), represents the estimated total annual timber supply from all forest lands in Josephine and Jackson counties. (Twenty-eight per cent of the JSYU public lands are outside the timbershed. Josephine County includes by far the

largest area common to both the timbershed and the JSYU). The Beuter report provides the basis for estimates of supply from all sources. The only adjustments made were based on proposed reduction in sales from public lands in the JSYU.

Employment (Direct) heads the grouping which presents full-time-equivalent employment that is directly dependent upon timber and forest development on public land in the JSYU. This dependence is generated through:

Timber: Logging and primary processing of timber.

Forest Development: Slash disposal (burning or gross yarding), tree planting, herbicide application, precommercial thinning and fertilizer application.

Non-Local: Pulp, paper and board manufacture, elsewhere in Oregon, which is based on coarse wood residue from primary processing.

Employment estimates represent that amount attributable to logging and primary processing of timber. Employment/timber processed relationships are based upon analyses and projections presented in Appendix H. For local (logging and timber processing) the ratios used were: 7.02 for 1973-74-75; 6.554 for 1980; and 5.755 for 1990. For non-local (processing of coarse wood

residue; chips and etc., elsewhere in Oregon) the ratios used were: 0.802 for 1973-74-75, 0.634 for 1980 and 0.571 for 1990.

Forest development practices analyzed were: slash disposal (burning and gross yarding); tree planting (initial and replant); precommercial thinning; herbicide and fertilizer aerial application. Data regarding Employment (Direct and Indirect) presents the cumulative employment linked to direct timber harvest from the JSYU. Estimates are developed from the direct employment effects, income multipliers (USDI, Socio Economic Data System, 1973), and historic log flow patterns for the JSYU. Estimates for Josephine County are based on 53 per cent of timber harvest dependent on all of the forest development based employment. Per cent Total for Josephine County is derived by dividing the estimated dependent employment by the total 1973-75 average employment, and projected (USDA, BPA, December 1976) employment for 1980 and 1990 as appropriate. Total Local is based on the sum of direct timber and forest development jobs which was increased by the weighted average income multiplier for Douglas, Jackson and Josephine Counties. All jobs (local and non-local) includes all avenues of direct employment (timber, forest development and non-local) increased by the same income multiplier factor as for "Total Local" jobs.

Local Personal Income represents estimated wage and salary, proprietorship and other earnings based upon 1974 relationships estimated from Regional Economics Information System data (USDC, January 1977) and increased by the same factors used for employment, to estimate indirect income effects.

Public Finance (O&C Payments) includes data and estimated to aid in understanding the likely impact of changes in O&C payments resulting from JSYU timber management upon property taxes paid on property or via changes in public services. JSYU dependent O&C payments are estimated for the O&C counties combined, southwest Oregon counties, Josephine County and Douglas County. These O&C payment estimates are based on stumpage price estimates for BLM in western Oregon (adjusted by historic differential for Medford District sales) and projections using a 2.84 per cent per year "real" price increase factor (USDA Timber Outlook, 1974) stumpage price estimates per MMbf were: $77 for 1973-4-5; $154 for 1980; and $204 for 1990. Stumpage price estimates for 73-4-5 are based on sales of 1970-1-2: for 1980, estimates are based on 1977 sales. O&C payments are estimated on a consistent basis, therefore provide useful comparisons of alternative situations. (The future amounts may be much different, because they will reflect inflationary impacts on stumpage prices.)

Tax Rate Equivalence of O&C Payments represents the amount of tax that would replace the O&C payment, based upon taxable property assessments. The estimate for 1973-4-5 was derived by dividing the estimated O&C payments for 1973-74-75 by the assessed True Cash Value within appropriate counties as of 1973-74-75 and as of 1977 for the short-term and long-term estimates of payments. Because stumpage price projections represent only relative price changes, the estimates of tax rate equivalence are based upon a reasonable procedure; however, differential rates of increase in T.C.V could change the actual outcome. (Both stumpage price and assessed values will in the longer

term change with the general price level. The stumpage price projection is, after 1980, net of general price increases. The assessed T.C.V. is as of 1977, and is not projected.)

3.3.5.1 Analysis Guidelines and Assumptions

Analysis Guidelines

The purposes and bases of the proposed action are to assure maintenance of long-term timber output in quantity equal to or greater than the allowable harvest. To analyze long-term impacts, a projection of timber output based upon the proposed action is needed. These projections must be of a with and without nature to provide meaningful information for comparison purposes. Consistent with that approach, effects of the changes in intensive forest development practices on allowable harvest are considered separately from changes due to reductions in the commercial forest land base and due to concessions to other uses of the forest resource. In most cases the effect of the net change is presented; however, the proposed action involves more than an adjustment in the allowable harvest.

The economic impacts due to increased/decreased timber sales and changes in operational systems will be presented separately. A change in allowable harvest will affect the level of employment in harvesting, hauling and processing activities, timber supply and public revenues. These effects, both direct and indirect, are the most obvious. The majority of the analysis is devoted

to quantifying, within limits of credible information, the short and longer term economic and social impacts of changes in the level of timber harvest.

As stated in the foreward, "The actions in this environmental statement include all development, protection, harvest and transportation practices carried out to produce raw material to help meet the nation's wood product needs." As harvest procedures and transportation practices are unchanged from the existing allowable harvest plan, socioeconomic variables related to those practices would not be changed by those aspects of the proposed action. Identifiable changes will occur as a result of the proposed harvest levels and forest development practices. Practices included are displayed in Table 1-7 with the associated levels of sustained yield for the JSYU.

The proposed action is designed to assure long-term forest productivity. Because the effects of forest management practices are realized in timber harvest many decades later, it is important to consider the future beyond the human lifespan. Projections of national wood products needs and local economic structure beyond two or three decades are tenuous; therefore, quantification of long-term economic impacts within the context of national needs is not attempted in this document.

The short-term socioeconomic impacts would become effective three to four years after implementation of a revised timber management plan. Short-term impacts (first decade) are based upon parameters projected for

1980. Long-term impacts are based on parameters projected to 1990 where pertinent.

Individual persons, households, families, neighborhoods, towns, counties and multi-county regions would be affected by the proposed action. It would be impossible to determine which of the persons, households, families or neighborhoods would be influenced. The social/economic units for which impacts will be assessed are towns, counties and multicounty areas.

The Medford timbershed (Jackson and Josephine Counties, as defined by Beuter, et al.) is the geographic area for which projections of total timber supply are available. Timber supply impacts are discussed in that context. Employment and associated impacts will be analyzed within the context of counties or multi-county areas as appropriate.

Assumptions

Demand for softwood products is affected by many influences. While it is assumed that these factors will change, it is also assumed that such changes will not be such as to diminish processing by local mills. At current relative prices, a sustainable rate of harvest by all owners will not exceed local capacity for timber processing.

Local mills will continue the 1972 pattern of timber processing. The mix of lumber, veneer and plywood, and chips and wood residue production and exports will be approximately the same as existed during 1972.

For timber from all ownerships, log flow patterns of 1972 will continue in future decades. Destinations of logs harvested from public lands in the JSYU will follow the same pattern as during 1973-75. Timber harvest is assumed to be evenly distributed over the sustained yield unit in the same pattern as BLM timber sales during the 1973-75 period.

Employment generated per unit timber harvested and/or processed will follow patterns projected in Appendix H, "Employment Impacts in the Medford Timbershed Associated with Bureau of Land Management Harvesting Alternatives in the Josephine Sustained Yield Unit."

Employment per unit of timber processed will decline due to changing technology. This element of employment decline is independent of, and will not be modified by the proposed action; however, it does influence magnitude of the projected employment impacts.

Population will follow trends indicated by the Portland State University, Center for Population Research and Census publication CPRC-Series P-2 #2, February 1976.

The ratio of employment to population in Josephine County will remain at 0.35, the 1976 level. This assumption is needed to estimate the effect of changes in employment level upon emigration, hence population. Real per capita personal income will not deviate significantly from the 1975 level of $4,478.

Stumpage prices per MMbf are reflected in O&C payments three years after the year of the sales.

3.3.5.2 Timber Harvest Impacts: Short Term

Introduction

The short-term impact of reduced harvest will be gradual as a result of standard terms of timber sale contracts, which allow a maximum of 36 months between date of sale and completion of harvest. The employment effects will not be fully realized, therefore, until three years after the effective date of the proposed allowable harvest and signing of subsequent sales contract. Announcement of the timber management plan may cause some immediate instability due to shifts in long-term expectations; however, substantive and persistent reasons for economic adjustment will not occur for two to four years.

Timber Output

Volume

Local. Compared to the existing cut, the proposed action represents a 40-million-board-foot reduction in annual allowable sales during the first decade, a 28 per cent reduction. Based upon location of timber processing during 1973-75 (Table 2-40), timber processing from BLM sales in the JSYU would be reduced by approximately 21 MMbf in Josephine County (Merlin 10 MMbf and Grants Pass 11 MMbf), 16 MMbf in Douglas County (Glendale) and 3 MMbf in Jackson County (Medford). These reductions amount to twelve per cent of the estimated rates of timber processing for Josephine County, 1.7 per cent for Douglas County and 0.6 per cent for Jackson County.

For Glendale, in Douglas County timber available for processing would fall in the twelve-to-eighteen per cent range of total mill capacity. The percentage will vary from year to year based on location of the timber to be harvested and needs of the timber purchaser.

For the southwest Oregon counties of Coos, Curry, Douglas, Jackson and Josephine, the reduction would represent 1.5 per cent of the total 1974 harvest from all lands (derived from data proved in J. D. Lloyd, Jr., December 1976).

National. Softwood sawtimber production from forests in the United States during 1970 was 46.2 billion board feet, International [inch rule (U.S.D.A., July 1974, p. 211). The loss of 40 million board feet in annual sales from the Josephine SYU would represent less than one tenth of one per cent of the national harvest.

It is not possible to anticipate the cumulative impact from all western Oregon forests managed by BLM until the land use plans are developed from which the allowable harvest plan for each sustained yield unit is set. To put the harvest in perspective, the total allowable cut of BLM managed western Oregon forests has been approximately 1.2 billion board feet. During the years 1973-75, the volume of timber harvested in western Oregon originating from public lands ranged between 609 mmbf and 1,455 mmbf, which were eleven and twenty per cent of the western Oregon totals for those years. The total harvest from public lands in western Oregon accounted for 2.8 per cent of U.S. harvest during 1970.

Price and Cost Impacts

National. Based on estimates of lumber demand elasticities (U.S.D.A., July 1974, page 150), the reduction in timber harvest from the JSYU, which would reduce the national quantity by about one tenth of one per cent, would increase the 1970-based price of Douglas-fir lumber by 88 cents per thousand board feet (Int'l. [).

Regarding probable inflationary impact, the change in softwood product prices (based on the 1976 level of Douglas-fir lumber prices) would be $1.63 per thousand board feet, for an annual total of $50 million. Impact upon the cost of living index will probably be negligible, the total cost increase would be less than four thousandths of one per cent of the 1976 national income.

All the above price- and cost-related impacts are based on a one-year (short-term) adjustment. For price to respond to a shift in quantity, ten years is long term. According to The Outlook for Timber (page 150), price response to a shift in quantity available will be expected to moderate to one fifth the magnitude of a short-term price impact due to product substitution and other compensating effects inherent in resilience of a market economy.

Increases in the cost of building a house one year after the proposal was implemented would be less than $100 dollars. Our rough estimate, based upon data from The Outlook for Timber, July 1974, pages 159 and 332, is $14.98 per housing unit (one- and two-family housing), with a one-year adjustment period. Given ten years for market adjustment, the cost impact in 1970 dollars would decline to $3.00, 20 per cent of the initial year effect.

Employment Impacts

Employment estimates are based on comparison of the proposed action with the situation that would exist if BLM's allowable annual sales did not change.

It is assumed that other sources of supply would produce as estimated by Beuter, et al., January 1976 (Appendix H). Another factor is that employment per unit of timber logged and processed is declining and is projected to continue. Beuter projected an approximately stable availability of timber for the Jackson and Josephine County area (less than 0.1 per cent decline per year over 100 years) except for a temporary eighteen per cent drop-off during the 1995-2005 decade.

Direct Employment

In this section, direct employment is structured to represent only "primary wood products" processing; which can reasonably be expected to change in response to changes in timber harvest levels. In terms of SIC code, the industry-commodity groupings responsive to harvest are logging (SIC 2411), sawmills (SIC 2421) and veneer and plywood mills (SIC 2436). For the Medford timbershed, the above categories accounted for 84 per cent of lumber and wood products (SIC 24) employment during 1972 (Wall, July 1977).

The direct employment impact via lumber and wood products would be the loss of 262 jobs in Josephine, Douglas, and Jackson Counties. Reduction in the processing of wood products residue for pulp and paper elsewhere in Oregon would be 26 jobs. Forest development jobs will increase by 35, for a net change in local jobs of minus 227. Employment for the Medford timbershed is projected (see Appendix H) to decline from the 1968-73 level, even though total harvest is projected to increase slightly during the next decade

(1975-85). The reason for the decline in employment requirements is an increase in labor productivity (Wall, 1975) resulting from phasing out of old plants, and adoption of modern technology.

The direct employment reduction attributable to the proposed action would be 3.5 per cent of the projected first decade total of direct lumber and wood products employment of 4,000 employees.

Based upon observed log flows, direct employment losses in Josephine, Jackson and Douglas Counties would be 105 (including 35 new jobs in forest development), 21, and 102 respectively. These reductions account for 6.2 per cent, 0.5 per cent and 1.4 per cent of direct timber-harvest and forest development dependent employment in those counties respectively.

The eight per cent change in employment for Josephine County attributable to the proposed timber management plan will be phased in as a result of the term of timber sale contracts. This six per cent adjustment will be significantly less in short-term impact on workers and their families than the eleven per cent (Table 2-37) year-to-year variation experienced during the 1970-to-1976 period. The recent historic pattern of instability in timber processing and employment results primarily from changes in market conditions for lumber and wood products.

Total Employment

Total employment impact is defined as the direct and indirect employment shift resulting from the proposed action. Indirect employment includes, for example, employment in services, retail trade, and further processing of wood products. To estimate such impacts, the employment factor derived from Appendix H and the "personal income multiplier" for lumber and wood products of 1.49 (weighted average for Josephine, Douglas and Jackson Counties) were used to adjust direct employment losses for each county (Social-Economic Data System, special tabulation, 4/18/77). Total, direct plus indirect, employment reduction (including the entire JSYU) due to the proposed action would be 336 plus 38 employees related to processing of coarse residues in pulp and paper (outside the Medford timbershed).

Based on log flows, the total expected employment losses implying forced worker readjustment would be 160, 30, and 146 for Josephine, Jackson and Douglas Counties; 38 jobs would be lost elsewhere in Oregon.

As percentages of average employment (all sectors) projected for 1980 in Josephine, Jackson and Douglas Counties, the projected reductions are 0.9 per cent, 0.06 per cent, 0.4 per cent respectively. These percentages reflect the compensating effect of increased employment in forest management and the local multiplier effect.

In summary, the direct employment effects of reduced timber harvest would aggravate but be much less, about six per cent, than the projected eleven per cent decline in primary lumber and wood products employment (Appendix H) during the next decade from reduced labor requirements per unit of wood products processed.

Incidence of Job Losses

Stevens (April 1976, page 114) reported with regard to projected Statewide employment declines in the timber industry in Oregon:

> As employment levels decline, the core labor force will be at an advantage due to greater seniority and access to job information. Thus, the costs of a major employment decline will be borne primarily by the peripheral labor force. They lack the attributes required to get the remaining wood products jobs, especially seniority.
>
> The advisability of major changes in timber harvest policy, then, depends on the capability of the larger economy to absorb those peripheral workers who become excess to the needs of the industry. This capability for absorption depends in part on a healthy national economy; the peripheral labor force suffers from recession through both layoffs in wood products and reduced job prospects outside the industry. The fate of peripheral workers will also depend greatly on the capabilities of local economies to absorb excess labor; this capability may vary substantially among communities.

Data regarding the relationship between total employment and employment in lumber and wood products for Oregon, Douglas County, Jackson County and Josephine County revealed a differential response to short-term employment

increases versus declines. As wood products employment increased, total employment sharply increased; however, when wood products employment declined, total employment declined much smaller proportions (than from an equivalent increase). This difference may reflect a tendency for unemployed workers to move into alternative employment and is applicable for western Oregon counties as a group.

For Josephine County, the number of families experiencing trauma of employment reductions, however small, would be accentuated by the recent experience of extremely high levels of unemployment compared to other Oregon counties (Table 2-50) and moderated by the lag of up to 36 months between timber sale and harvest. At the time the action is implemented, a maximum three year backlog of sales, based on the existing harvest plan will, under normal conditions, exist.

The three-year backlog will provide a pool of previously sold timber, acting as a buffer, and could soften the transition from the existing level of timber sales to the proposed level. The pool of previously sold timber will not exacerbate the transition and may damp employment impacts, depending upon harvest timing decisions of the timber buyer.

Community Personal Income Impacts--Short-Term

Estimates of the local personal income impact are based on earnings per wage and salary employee and, independently, on personal income per thousand

board feet. During 1974 the weighted average earning per wage and salary employee was $10,845 for Josephine, Jackson and Douglas Counties (Oregon Department of Human Resources, 1975). Community direct and indirect personal income per thousand board feet, weighted average, was $186.70 for Douglas, Jackson and Josephine Counties. Weights used were based upon JSYU log destinations.

For the three-county area, community personal income (direct and indirect personal income received by residents) as a result of timber harvest and related processing would decline by $3.6 million to $6.9 million, during the period that new sales phase into the harvest cycle. The low estimate is based on wage and salary employees only and does not include entrepreneurial income. The high estimate implies that the average community personal income exceeds by 70 per cent the income received by "covered" wage and salary workers as reported by the Oregon Employment Division. The probability that the actual effect falls between the two estimates judged to be high; however, there is no objective basis for using a single number to reconcile the two estimates.

Earnings and proprietorship income for 1974 would be reduced in: Josephine County by 1.5 to 2.9 per cent; Jackson County by 0.1 to 0.2 per cent; Douglas County 0.5 per cent to 1.0 per cent.

The projected total personal income declines are for the entire community. Individual workers or individual families may suffer severe (up to 100 per cent) declines if their principal means of support is a job in primary lumber

and wood products. Retained workers may not experience an effect on earnings resulting from the proposal. Firms providing goods and services in support of lumber and wood products industry will experience minor declines in business potential even smaller than for community income in aggregate.

Adaptation by resident workers and proprietors to changed earnings and employment opportunity will be within the ten-year term of the allowable harvest plan. Immediately noticed effects will be reduction in the labor force through emigration, increased unemployment or increased underemployment.

A study of Oregon wood products workers adaptation to job loss indicated, with regard to individual income, that:

> One cannot simply assert that the relative income position of (Wood Products) workers will remain constant as employment levels follow their projected decline; this remains an untested proposition since substantial employment declines (long-term reductions) have yet to occur (Stevens, 1976, p 111).

It is also clear that income impacts will depend upon the availability of alternative employment.

For Josephine County, the burden of any decline in per capita income may be especially severe since per capita income levels have been among the lowest

experienced by Oregon counties during recent years. Figure 2-36 illustrates this fact.

Population Impacts

Population impacts of the proposed action depend upon employment impacts and adaptation responses of workers as conditioned by the availability of local alternative jobs. If local alternatives are unavailable, the longer-term adaptation will be either acceptance of lower income or movement to another community where a job is available.

In the absence of local job alternatives and assuming 2.9 persons per job, and that underemployment is unacceptable to the affected workers, the total displaced population would be 90 for Jackson County, 460 for Josephine and 420 in Douglas. These estimates include secondary impacts. Inasmuch as the estimates assume there are no alternate local jobs, they indicate the extreme maximum induced emigration: 960 people for the three counties.

Based upon findings by Stevens that the peripheral wood products labor force is comprised of highly mobile workers who tend to be younger than the average for the population, we would expect to find a decline in resident population in the 18-to-30 age group. In addition, since many of the peripheral labor force members are young and/or students, the non-worker population per peripheral worker will be smaller than average; the estimate of maximum induced emigration by 960 persons is probably high.

Public Revenue Impacts--Short-Term

Under the O&C Act 50 per cent of receipts from timber sales are distributed to county governments. For each $100 reduction in receipts from harvest of O&C timber, the county governments of Coos, Curry, Douglas, Jackson and Josephine would lose $2.95, $1.83, $12.53, $7.84 and $6.04 respectively for a total of $31.19. The remaining O&C counties, none of which is in southwest Oregon, would lose a total of $18.81.

The existing allowable cut plan provides an allowable cut volume for the JSYU approximately 12 per cent of that for BLM in western Oregon. Stumpage prices for timber from Medford District averaged about 84 per cent of stumpage prices received by BLM for western Oregon timber during 1973-75. BLM sales account for approximately 90 per cent of total timber sale receipts from O&C grant lands. Based upon the above relationships, approximately nine per cent of O&C payments to counties were based upon timber sales from the JSYU. If Medford District stumpage prices increase to 90 per cent of the average for timber sold from public lands in western Oregon, (the trend since 1966 has been toward narrowing of the difference in stumpage price), the proposed timber management plan will reduce the proportion of O&C payments to counties attributable to the JSYU from nine per cent to approximately seven per cent. Receipts by county governments from O&C payments, therefore, would decline by approximately 1.5 to 2 per cent of the amount that would be received by harvesting at the average rate of 146 MMbf per year.

Based upon stumpage price of $144 per thousand board feet (84 per cent of the $171 per MMbf sales, the western Oregon BLM average for FY 1977), Josephine County O&C receipts potential would decline by $348,000 per annum (40,000 x 144 x 0.0604) during 1980, if the proposal were adopted. For comparison, Josephine County received $7.1 million in such revenues during FY 76 and $12.8 million during FY 77 under the current allowable harvest. About $1 million of the $12.8 million received by Josephine County during 1977 was based on sales from the JSYU. Southwestern Oregon counties would experience an aggregate reduction of approximately $2.3 million, compared to O&C Act revenues of $66 million in FY 77. For all O&C counties combined, the reduction in potential revenues (based on a reduction of 40 MMbf in harvest) would be approximately $2.6 million of $106 million disbursed to counties during FY 77. There will probably be no decline in O&C payments attributable to the JSYU because harvest levels during the 1973-75 period were 20 MMbf below allowable sales, and because stumpage prices (in constant dollars) are projected to increase by 2.8 per cent per year (USDA, July 1974).

Based on comparison of current management (short-term) (Table 3-13) with proposed management, short term, the reduction in total O&C payments will be 3.0 million dollars. For Josephine and Douglas Counties, the comparable reductions would be $400,000 and $800,000 respectively. Total O&C payments based on timber sales from the JSYU projected under the proposed action, short term (circa 1980), will be approximately the same as for 1977. Comparable O&C payments during 1973-74-75 were about 3.3 million less than projected for the first decade under the proposed action.

Any property tax rate increases to compensate for the reduction in potential receipts for all O&C counties combined would be nine cents per $1,000 assessed valuation. For the southwest Oregon counties the combined property tax increase to restore the loss in potential local public revenue would be 35 cents per $1,000 assessed value, whereas for Josephine and Douglas counties it would be 50 and 42 cents respectively. In contrast, O&C revenues to county governments have nearly doubled from 1976 to 1977.

3.3.5.3 Timber Harvest Impacts - Long Term

The purpose of the timber management plan is to maximize long-term timber production, while stabilizing harvest opportunities. The even-flow criterion implies that the welfare of future generations is considered equally important as that of current generations. In addition, the "non-declining" aspect of the rule implies that if any errors are made, they should be made in favor of future timber availability and long-term stability of communities.

Employment and Personal Income

Reductions in employment and local personal income resulting from the reduced harvest would persist for many years. However as machinery replaces labor in the timber milling processes, the employment and income declines attributable to the proposal would be less noticeable. In the longer term, after nine decades, employment and income would exceed that expected without the proposed action.

The proposed action will reduce local personal income in approximately the same proportions as it reduces employment. Unemployment compensation will provide a temporary income base for displaced workers. Any normal per capita income increase from national economic conditions will tend to be dampened (dependent upon the extent of emigration versus underemployment). Duration of the damping effect is unknown.

Employment Stability

As recognized in the short-term impact section, employment related to timber harvest will decline due to changing technology. This element of decline is independent of, and will not be modified by, the proposed action; however, it does influence the projected impacts.

Logging and milling timber has historically been an unstable industry, subject to rapid changes in prices and demand, a fact that is reflected in the year-to-year vacillations of employment in the Josephine County economy. Aggravating this situation, the proposed action would put people out of work who would find insufficient substitute jobs in local areas and would have to accept either underemployment or emigration. However, this impact is a near-term one. Much worse would be the long-term, perhaps even indeed permanent, reduction in employment that would follow if the harvest were maintained at its present higher level. Continued existence of the peripheral labor force, a mobile labor pool that enables loggers and millers to respond

swiftly to changes in the wood products market, is unlikely to be affected by the proposed action.

The plan will have a decade-to-decade stabilizing influence on the economy of local timber dependent communities. Stabilizing influences of the proposed action, however, will be a minor factor even for Grants Pass and Glendale. Year-to-year changes induced by timber industry related factors have been much larger (Section 2.1.3.5). Annual timber harvest in Josephine County during 1965-75 ranged from a minimum of 106 MMbf in 1971 and 1975 to a maximum of 194 MMbf in 1972. For Jackson and Josephine County combined, during the same period, the maximum harvest (755 MMbf) was during 1972, and the minimum harvest (429 MMbf) was during 1975. The above variability, presumably due primarily to market factors, far exceeds the timber volume impact of the allowable harvest plan. During the past decade however, there has been no discernible trend. The proposed action will shift the multi-year average harvest by an amount considerably less than historical year-to-year variations.

In the longer term (beyond ten years) continued harvest of the 12 MMbf per year from low intensity lands is contingent on the results of the ten-year trial program on these lands. If such harvest is discontinued the reduction would be two per cent of the projected level of timber harvest in the Medford timbershed and would be responsible for elimination of 111 jobs in the destination communities. As a maximum, assuming no alternative jobs and preference

for mobility over underemployment or reduced earnings, an additional 320 persons would emigrate for new jobs.

Public Revenue

Public revenues in the counties receiving substantial payments from Federal timber sale receipts are unstable due to rapid responses by logging and milling firms to shifts in the market for softwood products. Factors contributing to instability include both stumpage price and quantity harvested. The proposed decline in timber sales would cause a reduction in timber receipts. Recent experience, however, has been that stumpage price increases have compensated for short-term timber harvest declines. In the longer term, public revenues will be more than without the proposal because of enhanced long-term timber yield.

Response to the 12 MMbf reduction of total sales will cause decline in total O&C payments of less than 1.2 million dollars.

3.3.2.4 Forest Development Impacts: Short and Long Term

Planting would be conducted on all harvested lands (backlog and new), a plan that implies an average rate approximately 5.0 times that of the existing pratctice (6,250/1,263= 4.95).

Tree planting will require labor equivalent to 21 full-time workers annually per year. Total direct and indirect employment stemming annually from tree culture and planting will be in the neighborhood of 27 (full-time equivalent) jobs, an increase of 25. The local jobs, in reality, are seasonal for approximately four months. During the typical season, 81 (an increase of 75) workers would be employed for four months. Slash disposal (burning and gross yarding) will create a full-time-equivalent of fifteen jobs per year. Nearly all of the employees needed will probably be local. The major remaining practices are fertilizing (aerially applied) and control of competing vegetation (predominantly aerial application of herbicides), both of which are capital-intensive and would have minimal direct impact on local employment opportunities. The labor intensive practices would probably create an increase of 38, for a total of 42 full-time equivalent jobs due to forest development practices.

Without the forest development features of the proposed action, i.e. those that are deviations from existing practice, timber harvested from the JSYU would be about one third less than is proposed. By the year 2020, this reduction would account for approximately 190 local jobs. In the first decade, the same difference in annual harvest would account for approximately 300 jobs. The difference results from the projected decline in labor requirements in primary wood products processing.

3.3.5.4 Conclusions Regarding Significance

Short-Term

The socio-economic impacts judged to be significant are limited to the impacts on individuals and households resulting from the trauma of added uncertainty regarding employment and income stability, and of adapting to employment losses. Approximately 160 persons will be displaced from their current employment as a result of the proposed action. Employees of sawmills and veneer and plywood mills in the Glendale-Merlin-Grants Pass area are most susceptible to job loss resulting from the proposed action. (If reductions in work force were assigned to workers by lottery, wood products workers in the Glendale, Merlin and Grants Pass areas would have a 3 to 5 per cent probability of losing their job. Because of voluntary job separations, the exposure to involuntary layoff is less than 3 to 5 per cent.)

Employment and income impacts would be concentrated in the local area, contrary to the effect on wood products markets which would be diffused throughout the national market. Housing cost and other commodity output related impacts are judged to be insignificant. Cost of a single family residence would increase by less than two-tenths of one per cent. Quantity reductions would be less than one-tenth of one per cent.

Actual impacts on public revenues and public services delivery would be insignificant because stumpage price increases will provide for increased O&C

payments, compared to the existing situation. Projected O&C payments will be less under the proposed action than with an extension of the existing situation.

The effect on property taxes for a $40,000 residential property would be insignificant. From the perspective of comparison of the projected situation with-and-without the proposed action the maximum increase in the tax equivalence would be twenty dollars. In comparison of the existing situation with the proposal, the property tax equivalence on a $40,000 property would be an eight dollar reduction.

Effects of the proposed action on employment stability and social stability are judged to be significant even though recent variations in harvest in Josephine County exceed those expected to result from the proposed action. This judgment is based upon indications of existing employment social instability manifested in high (compared to Oregon) incidence of: poverty; divorce; and unemployment; and low per capita income. Contrary indicators are low crime rates. On most measures of socio-economic conditions Josephine County was abnormal.

Long-Term

Projections are for a favorable impact on: wood products supply; housing construction costs; employment stability; and local public revenue. These impacts are judged to be significant in their effect upon the long-term

human environment, even though they will not be realized for many decades, since they are expected to be perpetually recurring.

3.4 EXISTING LAND USE

Livestock grazing will be minimally impacted by the proposal. Harvest and specific forest development treatments may take place on portions of the present grazing area. Impacts will be short term and alternative grazing areas are available.

Road construction impacts on land use are limited to possible safety hazards associated with driving on logging roads.

There are no short-term wilderness values impacts. Long term impacts are dependent on the findings of studies which may take place upon completion of a wilderness inventory.

There are no significant impacts which endanger the characteristics of the Rogue River which were recognized by its placement in the National Wild and Scenic River System.

3.4.1 Grazing

In the JSYU, 9,399 acres are leased for livestock grazing. Figures are unavailable on how much public lands leased for grazing are in the commercial forest base. If all of it were in the base, only a small portion would be involved in a timber sale or regeneration program in any one year or grazing season. Impacts are minimal since alternate areas are available as temporary

replacement grazing units for the nine leasees to continue 456 AUM's of forage utilization.

Worst case situation analysis discloses several ways in which grazing could be impacted. It is highly unlikely that any of them will be significant either individually or in combination. Possible impactors include the following:

- Road construction removes forage vegetation. Roads, however provide access to additional forage areas.
- Dragging logs, slash burning, herbicide usage to encourage commercial coniferous species and scarification remove forage at least temporarily.
- Logging slash, prior to slash disposal, reduces livestock access to forage and increases the possibility of leg injury to foraging animals.
- Burning, herbicide spraying, scarification, regeneration planting and fertilization can result in changes in the herbaceous and shrub vegetative layers which affect the quality and palatability of forage.
- Reforested areas may be fenced to protect the seed or seedlings from animal damage, including livestock. These areas would be lost to grazing for at least five years.

3.4.2 Transportation and Utility Networks

Construction or reconstruction of approximately 600 miles of permanent road during the proposal period would increase traffic volume and alter traffic patterns in existing roads. Changes would be attributable to both timber management and recreation seekers bound for newly opened areas.

Resulting impacts would be safety hazards due to increased vehicle numbers, dust, and noise. Impacts of recreational use on forest areas made accessible by the new roads are discussed in Section 3.3.1.

3.4.3 Wilderness Values

As discussed in Section 2.1.4.6, there are certain areas within the JSYU not suitable for commercial timber production which will be inventoried to determine whether they qualify for wilderness study areas status. During the course of these wilderness inventory and suitability studies, there will be no impacts to the instant wilderness study area, and areas unsuitable for commercial timber production, which are being examined.

The existing 210-acre Brewer Spruce Research Natural Area and the Rogue River corridor will not be impacted by any aspect of the proposed action.

If there are roadless areas of 5,000 acres or more with wilderness characteristics within the lands suitable for commercial timber production, they would be significantly impacted by the proposed action. However, based on our preliminary examination of these lands, we do not believe that there are areas other than Mule Creek and Zane Grey within the Josephine Sustained Yield Unit which qualify for wilderness study under FLPMA.

3.4.4 Rogue Wild and Scenic River

The impacts to the water quality of the Rogue River would not decrease the recreational and wilderness values of the Rogue as a wild and scenic river. Although the proposed action would have a potential in the worst case, of increasing the total sediment carried by the river by 2.8 per cent compared to water year 1975; no such impacts would be anticipated. The proposed action actually represents a decline in the rate of harvest from 146 million board feet per year to 106 million board feet per year. The overall impacts to the environment of the JSYU caused by the proposed action would be at least 27 per cent less than those of the present allowable cut. The analysis of impacts in this chapter has considered the effects that would be caused by the proposal compared to what is presently occurring. The comparison has been based on what would occur if the proposal were to be implemented in addition to those impacts from all other activities occurring within the borders of the JSYU. Since the actual impacts within the JSYU due to activities of the BLM Timber Management Program would decline to no more than 73 per cent of the present activities, the impacts to the Rogue River would decline by 27 per cent compared to water year 1975.

Visual resource management will be used to enhance recreation resource values within the Rogue River corridor. Buffer zones would prevent visual intrusions in close proximity of the Rogue. The preservation of stream shoreline will enhance the visual setting by maintaining naturally-occurring vegetation and terrain, and will provide sound screening and visual isolation.

No impacts would occur to the visual foreground of the Rogue River Trail or the river itself.

Timber cutting within the visual middleground or background would not visibly or audibly intrude upon the river environment during the summer use period. Timber sale areas would be designed so as to not contrast with natural appearances after harvesting.

There are no significant impacts anticipated which would endanger the environmental integrity or recreation values of the Rogue Wild and Scenic River.

4. MITIGATION MEASURES NOT INCLUDED IN THE PROPOSAL

With present technology, impacts identified in Chapter 3 are not mitigatable beyond those levels included in the proposal and described in Section 1.6 as project design features.

5. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

Chapter 5 presents an analysis of the unavoidable adverse impacts that would result from implementation of the proposed action. Adverse impacts are those of the worst case scenario identified in Chapter 3. Project design features discussed in Section 1.6 constitute best management practices employed for each treatment, and design features are specifically selected from among a wide variety available to meet the situation on each individual treatment area.

The proposed action constitutes a reduction in volume to be harvested; therefore less area is subjected to logging treatments. Forest development practices, however, are increased over present levels.

5.1 PHYSICAL ENVIRONMENT

5.1.1 Climate

Areas subject to logging and construction activities would undergo an increase in temperature extremes, both daily and annually. Daily increases would go from an average 15 to 20 degree variation to as much as a 70 degree (F) variation in surface temperature (within 2 inches of the ground surface). Annual variations would increase by as much as 25 degrees due to exposure to direct sunlight in summer, and radiation cooling with cold air drainage in winter. These impacts are significant, possibly effecting vegetation regeneration and seedling mortality ratios.

Relative humidities in the areas subject to logging would have decreases from present ranges of 45 to 95 per cent of saturation to ambient ranges of 20 to 95 per cent of saturation. Increased exposure to wind and convective air movement would cause more evaporation of existing moisture; greater variation in humidity would result. Summer drought conditions would prevail in areas previously protected by forest vegetation. These effects would be of significance in reforestation success.

Air movement would increase in the areas subjected to cutting and road construction. Windthrow of trees on margins of cut areas would result in a loss of ten board feet per acre per year. This amount is of minor significance.

5.1.2 Air Quality

A decline of air quality due to particulate pollution would occur during the dry season (summer) in the vicinity of the logging activities and logging roads. A total of 173,640 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery. The operation of internal combustion engines directly related to the forest management practices of the proposed action would cause the following increases in pollution: nitrogen oxides, 141 tons/yr.; sulfur oxides, 4.7 tons/yr.; carbon monoxide, 513.2 tons/yr.; particulates, 8.44 tons/yr. Since the increased pollution would disperse in unpopulated areas, these amounts are of minor significance.

Smoke pollution (a form of particulate pollution as the main effect) would impact the visual resource within an estimated five-mile radius of each burning event. The impact would tend to be negligible since most burning would be done during periods of cloudy or rainy weather. In the worst case, a possible increase of 9.3 per cent in particulate pollution would occur due to the slash burning (if all the smoke produced by the slash disposal were concentrated in the immediate air over the JSYU).

During herbicide applications a maximum of 20,000 gallons of diesel oil would enter the air as volatile aerosol over ten years. Maximum amounts of herbicides drifting (to unknown distances) over the ten year period equal: silvex (2,4,5-TP), 1,087.5 lbs.; 2,4-D, 1,087.5 lbs.; round-up, 726.5 lbs.; atrazine, 3,200 lbs.; and dalapon, 3,300 lbs. These amounts would be of localized significance, especially if drift were to contaminate water bodies.

5.1.3 Soil

Nutrient losses from the soils of the areas subject to the silvicultural practices would equal one hundred per cent of the total values illustrated in Table 3-5, in the worst case situation. These losses would be of site specific significance; they would be minor compared to the whole of the JSYU.

Surface disturbance and compaction would equal one hundred per cent of the amounts given in Table 3-6.

Erosion amounts for the components of the proposal would approach one hundred per cent of the following amounts as a worst case:

Yarding and Loading	
Tractor Methods	3,970 tons over 4 years
Cable Methods	907 tons over 4 years
Transportation System	
New Road Construction	152,000 tons over 4 years
Reconstruction and Maintenance	7,500 tons over 10 years
Scarification	28,125 tons over 4 years

These amounts would be of site specific significance to the whole of the JSYU.

Fertilization would cause an increase in the solubility of organic matter, and an increase in the growth of most plants in the entire forest ecosystem.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate the extremes of temperature and humidity.

The amount of herbicides that would enter the soil of the JSYU over the ten-year period would be estimated as one hundred per cent of the highest values given in Table 3-7.

5.1.4 Water Resources

The worst case analysis of impacts to the water resources is based on what would occur as a consequence of the occurrence of a 100-year storm (an event with an annual expectancy of occurrence of one per cent). Such a storm last occurred in December 1964, causing severe damage throughout Oregon and Washington. The effects of that storm were estimated to have increased the rate of sedimentation by over 22 times (Fredriksen, 1971). Therefore, the worst case impacts to the JSYU would be 22 times the anticipated impacts for a normal water year, as presented in Chapter 3. The chance of such an event occurring during the ten-year period of the proposal would be one in ten.

The following impacts would occur on the lands subject to the proposal:

Proposal	Increase in Sediment Yield
Transportation System	49,865,860 tons
Yarding and Loading Practices	60,234,900
	110,100,760
Compared to average year	2,508,811 tons

(An increase of 48.9 times the anticipated increase due to the proposal in a "normal" year)

Increases of annual yield and other resource values would be site specific.

It should be remembered that the increases in sediment yield due to a 100-year storm would have devastating effects on all streams of the geographic region. Other values, such as roads, bridges, houses, and irrigation projects would receive similar impacts.

5.2 BIOLOGICAL ENVIRONMENT

5.2.1 Vegetation

Approximately 24 per cent of the old-growth (200+ years) forest community would be removed from commercial forest land in the JSYU during the proposal period. Early seral stage communities would increase an estimated 275 per cent over their present proportion. This impact represents a significant depletion of old-growth habitat as well as a significant increase in early seral habitat. Approximately 4,400 acres would be precluded from vegetation growth due to road construction. This is insignificant for the JSYU as a whole.

Following harvest artificial reforestation, predominately with Douglas fir, would establish a monoculture. Subsequent development practices designed to favor commercial coniferous species would reduce or inhibit species normally found in association with early seral stage Douglas fir. This represents significant changes to existing community structure.

Timber management, therefore, could be viewed as an unavoidable adverse impact to vegetation because timber harvest alters the composition of the

pre-disturbance forest community, and forest development practices alter the composition of the seral communities which naturally occur following forest disturbance. Development practices ultimately shorten the time required for the forest community to reestablish itself through seral modification of the physical site. The reestablished forest would be harvested before it could attain the community structure of the pre-logging old growth community. Approximately 34,000 acres of mature and old growth community would be unavoidably lost during the 10-year life of the action. If the proposed action were implemented into perpetuity all the old growth on the high intensity lands would be harvested within five decades. This impact is highly significant.

5.2.2 Animals

5.2.2.1 Terrestrial

The proposed action would alter habitat conditions through timber harvest on approximately 50,000 acres of high intensity lands in the JSYU. Most of this area is currently old-growth habitat. Although as much as 130,000 acres of old growth will remain on low intensity and limited management lands, the impact to wildlife dependent on old growth will be unavoidable and significant. Old growth would be eliminated on high intensity lands in approximately five decades if the proposed allowable cut level was continued that long. During the ten-year proposal life approximately 24 per cent of the old growth trees would be eliminated.

Assuming that old growth habitat dependent species are currently at carrying capacity (a logical assumption when one considers the long time population has had to stabilize and the considerable habitat alteration that has already occurred), any reduction in area will have a significant adverse effect on dependent animal populations.

Development practices as proposed would maintain high intensity lands in an essentially Douglas fir configuration and would discourage the development of other vegetation which provides forage and habitat for large and small animals. This could be significant during the period when it is necessary to control vegetation which competes with comercial coniferous species.

The 4,400 acres to be occupied by new roads would be unavailable for growth of wildlife forage. Roadside plantings of palatable forage species would partially mitigate the adverse impact, rendering net impact insignificant.

Snag removal, accomplished during timber harvest for safety reasons, would eliminate critical habitat for a variety of animal species. The removal of dying trees for insect or disease control precludes the development of succeeding snags to replace those trees which eventually decay and fall. This represents a significant impact on dependent wildlife species.

An undetermined amount of TCDD (dioxin) bioaccumulation would be likely in animals exposed to silvicultural applications of the herbicide silvex.

5.2.2.2 Aquatic

Fishes and aquatic invertebrates would be adversely impacted by stream bottom sedimentation and seasonal increase of suspended sediments due to logging, road construction or maintenance and scarification. Worst case analysis discloses over 192,000 tons of soil erosion (Section 5.1.3). Should all this soil reach streams, an unlikely occurrence, the impact would be directly related to flow levels of affected streams. In the most likely case, peak erosion would coincide with peak stream flow and impact would be reduced by flushing. Nonetheless, the impact could be significant on fish habitat.

Herbicide application would introduce undetermined concentrations of toxic chemicals in the aquatic environment. It is doubtful, although possible, that levels of toxic chemicals so introduced could exceed lethal levels for aquatic organisms.

Fertilization may increase nutrient enrichment of streams leading to increased algal growth. Increased biochemical oxygen demand of algae would decrease the amount of dissolved oxygen available for the sustenance of fishes. Impacts of fertilization on aquatic life would probably be insignificant.

5.3 SOCIAL ENVIRONMENT

5.3.1 Recreation

Recreation activities oriented toward appreciation of natural beauty and solitude would be unavoidably impacted by timber management actions, at least temporarily, in any specific location subject to such actions.

5.3.2 Cultural Resources

Some historical and archeological values would be unavoidably impacted since it is impossible to locate all such sites in the dense vegetation of the JSYU. Level of significance would depend on the scientific value of each site.

5.3.3 Visual Resources

Change would occur in the present landscape. All timber management treatments introduce contrasts from the existing visual mosaic resulting in unavoidable short term adverse impacts. Smoke from slash burning would create an impact on visibility.

5.3.4 Noise

Noise associated with proposed actions would create adverse impacts to those who are in the forest seeking solitude.

5.3.5 Socioeconomic

Compared to the timber-based employment projected for 1980, an employment reduction of more than 370 jobs would be expected to follow the proposed lower harvest level (270 jobs lower if compared with 1973-75 levels). The decrease in aggregate personal income of resident workers and proprietors is projected to be 1.5 to 2.9 per cent in Josephine County, and less than one per cent in Jackson and Douglas Counties. Induced emigration from the three counties might be as much as 960 persons but probably would be markedly less. The adverse residual socio-economic impacts judged to be significant are primarily to the impacts on individuals and households resulting from the trauma of added uncertainty regarding employment and income stability, and of adapting to employment losses.

Effects of the proposed action on employment stability and social stability are judged to be significant even though recent variations in harvest in Josephine County exceed those expected to result from the proposed action. This judgment is based upon indications of existing employment and social instability manifested in high (compared to Oregon) incidence of: poverty; divorce; and unemployment; and low per capita income. Contrary indicators are

low crime rates. On most measures of socio-economic conditions Josephine County was abnormal.

Annual public revenue for all O&C counties would be expected to decline about $3.3 million below that projected (based on current management) for 1980 based on recent stumpage prices. Josephine County would receive some $400,000 less than projected under current management. In view of the trend in timber stumpage prices, however, a decline in O&C payments below recent levels is not expected.

6. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY.

This chapter is intended to summarize the trade-offs between the short-term uses entailed in the proposed action and the long-term resource-use and environmental effects of the proposal. The short term discussed is ten years, the term of the proposed allowable cut plan. The long term is the time after all coniferous trees now standing on the high-intensity lands designated for inclusion in the harvest plan would be cut--approximately 80 years and longer.

The use of 4,400 acres for new timber management roads would remove that land from vegetative production and wildlife habitat for the long term.

The short-term use of the high intensity lands for timber harvest would increase the long-term production of wood fibers, as old, slow-growing or stagnant stands are replaced by young, thrifty stands managed for optimum wood production. In the long term, as the area approaches a balance of age classes, there is a potential for increasing the allowable harvest. The trial harvest on low-intensity lands may lead to similar results.

In the long term the harvest of old growth timber on these lands would encourage the expansion of earlier successional stages of habitat. Some non-timber plant species and specific animal species dependent on old-growth community conditions would be eliminated in these areas. The habitat changes, on the other hand, would enhance the potential for deer and elk and provide for

a greater diversity of small mammals and birds on these areas. The removal of many snags and dead trees in the course of harvesting timber would reduce habitat for cavity users.

The loss of old growth timber from these areas would also eliminate an esthetic resource, particularly for direct contact viewers. However, the resultant variation in visual features in the emergent managed forest will have esthetic appeal of a different kind; in some cases visual features will be enhances for the foreground or background viewer.

Although access will be increased for recreation users such as hunters and berry pickers with consequent increase in such dispersed uses expected to occur, the more managed environment will be less attractive to, and is expected to diminish visitation by recreationists, who seek the beauty and solitude of the natural forest.

Logging activities would inevitably cause some erosion and compaction of soil. The resultant long-term loss in soil productivity would be partially compensated by fertilization. Loss of soil and sedimentation due to erosion would be minimized by project design features and would revert to natural levels on each affected site within the short term. Sediment accumulation in streams, however, would have adverse affects on aquatic habitat, which would continue over the long term.

Annual slash burning would have at least localized adverse impact on air quality and visibility during burning periods.

Intensive timber management practices such as herbicide application would favor survival of coniferous trees and discriminate against hardwood trees, shrubs, grasses and herbs. Application of herbicides and fertilizers would increase wood fiber production in the long term and provide for higher rates of harvest in the short and long term. As a result of the use of the herbicide Silvex, "dioxin", bioaccumulation in some animals will occur, with undetermined effects which would extend over the long term.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This chapter identifies the extent to which the proposed action would irreversibly limit the potential uses of the land and resources. The term irreversible means incapable of being returned to its original state. Irretrievable means a resource or value cannot be replaced.

7.1 PHYSICAL ENVIRONMENT

While slash burning would not be anticipated to significantly lower the air quality of the JSYU, there is a possibility that particulate pollution would increase by 9.3 per cent.

The maximum amount of soil that would be irretrievably lost due to the proposal would be 208,648 tons over the ten years.

An unknown decline in the water quality of some streams would occur due to contamination by sedimentation, debris slides, nutrient losses from soil on logged areas, and application of chemicals.

7.2 BIOLOGICAL ENVIRONMENT

Approximately 55,000 acres of old-growth Douglas-fir community would be irretrievably lost due to logging operations. Some unidentified endangered plant species could be lost, directly through logging, road construction or

herbicide application or indirectly as a result of habitat changes. Permanent road construction would eliminate vegetation from 4,400 acres. Some irreversible loss of vegetative productivity would occur on approximately 12,000 acres of land subjected to soil compaction.

Wildlife species dependent on old growth habitat would be forced to emigrate. If other areas were overcrowded, many of the displaced animals would die.

Known nest sites of spotted owls are protected, but other nesting pair could be irretrievably lost if their location were undetected prior to harvest. An interagency protective program now being worked out will provide a spotted owl gene pool for perpetuation of the species throughout its present range.

7.3 SOCIAL ENVIRONMENT

There would be irretrievable loss of solitude, serenity, or isolation due to timber management activities. Some timber management activities would result in the loss of opportunities for the pursuit of recreational activities.

Damage or destruction of any archeological site would be irreversible and irretrievable. Knowledge lost as a result would be permanent.

The alteration of historical sites would result in the irretrievable loss or diminution of their original intrinsic value to society. The potential of the undisturbed sites and their settings to provide interpretive, educational, recreational, and esthetic opportunities would decrease irretrievably.

The proposed action will commit public funds which will be returned in the form of timber yield over many decades. The resources basically manpower, chemicals and energy would be irreversibly committed in expectation of increased growth rates of timber. These expectations are the basis for approximately one-third of the annual harvest in the proposed plan.

Based on present operating costs, implementation of the proposal is expected to require approximately $3,000,000 per year. This includes planning, layout and administration of timber sales; planning, contract cost and administration of forest development projects; and provision for seedling planting stock; and the tree development program.

7.4 LAND USE

Land invested in roadways, both existing and proposed, is irreversibly lost. Restoration techniques applicable in gentle topography are not effective or practical in the steep terrain of the JSYU.

The proposal includes no commitment of de facto wilderness areas to timber management which are irreversible or irretrievable.

8. ALTERNATIVES

Eight alternatives to the proposed action will be described and analyzed in this chapter. Impacts on the environment will be identified, mitigating measures to prevent or minimize the impacts will be discussed, and adverse impacts which cannot be avoided will be identified for each of the alternatives. See Table 8-1 for treatments involved in the proposal compared with the extent of treatments in certain alternatives.

The eight alternatives are:

1. No timber management program.
2. No control of competing vegetation.
3. Limited investment in timber production.
4. Utilization of surplus inventory.
5. Forestry Program for Oregon
6. Substitute sources.
7. Substitute materials.
8. No action.

These alternatives are not the only alternatives to the proposed action but represent a cross-section of possible options. Land-use allocation options were considered in the Management Framework Planning process and are discussed in Section 1.8.1.2. The 2.23 million cubic feet from trial harvest on low intensity lands is an intact feature of any of the timber harvest alternatives except no action.

Table 8-1

Comparison of Treatments for Ten-Year Period -- Proposed Action and Selected Alternatives

	Proposal		Alternatives				
	High Intensity Lands	Low Intensity Lands	No Control of Competing Vegetation	Limited Investment	Utilization of Surplus Inventory	Forestry Program for Oregon	No Action
Harvest in First Decade-							
Million cubic feet	18.39	2.28	14.86[1]	17.37[1]	21.69[1,2]	22.28[1,2]	28.63[3]
(Million board feet Scribner)	(94)	(12)	(76)	(89)	(111)	(114)	(146)
Treatment - acres involved							
Transportation System							
Construct 500 miles of permanent road	3,940	400	4,400	4,400	4,400	4,400	4,400
Reconstruct 100 miles of existing road	0	0	0	0	0	0	0
Surface 50 miles of existing road	0	0	0	0	0	0	0
Shelterwood Harvest							
Regeneration Cut	36,000	5,000	29,500	36,000	43,200	43,500	47,200
Final Harvest Cut	9,000	0	6,100	7,700	9,500	9,600	11,800
Clearcut	5,000	none	3,400	4,300	5,300	5,400	6,600
Slash Disposal							
Burning	10,000	100	6,900	8,700	10,700	10,800	0
Gross yarding (including machine piling)	30,000	3,500	23,900	29,300	35,300	35,600	300
Site Preparation							
Herbicide	33,500	1,000	0	29,800	36,500	36,800	0
Mechanical Scarification	160	0	160	160	160	160	0
Planting							
Replant or Interplant (backlog)	9,200	0	9,200	9,200	9,200	9,200	9,200
Initial Planting	41,000	0	27,900	35,300	43,500	43,900	10,000
Replant & Interplant (new cutting areas)	12,300	0	8,400	10,600	13,000	13,200	2,200
Herbicide Release	13,200	0	0	0	14,000	14,100	0
Precommercial Thinning	14,200	0	2,300	0	14,200	14,200	0
Fertilization	18,900	0	12,800	0	20,000	20,200	0
Commercial Thinning	4,700	0	4,700	0	4,700	4,700	0

1 Harvest computed for allowable cut base (222,896 acres) to which is added trial harvest from low intensity lands at same rate as the proposal.
2 Rate of harvest different for subsequent decades, see narrative for this alternative.
3 Harvest computed for allowable cut base of existing declaration (334,500 acres). See Section 1.9 for assumptions employed.

8.1 NO TIMBER MANAGEMENT PROGRAM

ALTERNATIVE NO. 1

Under this alternative, all of the lands in the Josephine Unit could be included in the wilderness inventory process provided for in Section 603 of the Federal Land Policy and Management Act.

This alternative could not be adopted without legislation to amend the O&C Lands Act (43 U.S.C. 1181a).

This alternative would require the cessation of all activities currently carried out for growing and harvesting timber.

It is assumed that some of the protection practices associated with timber management, such as fire suppression and revegetation of denuded areas, would be continued to protect and enhance non-timber values and uses.

Most of the present road system would be abandoned under this alternative with roadbeds being stabilized and revegetated. It is assumed that use and maintenance will continue on selected roads to provide visitor access and to enable other agencies and private companies to continue their timber management programs.

8.1.1 Climate

8.1.1.1 Environmental Impacts

An estimated 500 acres per year would receive impacts to the microclimate due to natural occurance of fires.

8.1.1.2 Mitigating Measures

The lands disturbed by fire would be rehabilitated by planting (or other measures, as the site dictated).

8.1.1.3 Residual Impacts

The residual impacts on individual cleared lands would tend to decrease with regrowth.

8.1.2 Air Quality

8.1.2.1 Environmental Impacts

The present air quality of the JSYU would remain at the levels of 1.088 tons per cubic mile for particulates, 7.598 tons per cubic mile for carbon monoxide, and 1.877 tons per cubic mile for sulfur dioxide. No estimates could be made for hydrocarbons. These amounts are within present standards for air quality in southwest Oregon.

8.1.2.2 Mitigating Measures

There would be no mitigating measures.

8.1.2.3 Residual Impacts

There would be no residual impacts.

8.1.3 Soil

8.1.3.1 Environmental Impacts

The present average amount of erosion that is occurring on the undisturbed areas of the JSYU (45 tons per square mile per year) would continue under this proposal. Therefore, a total of 17,655 tons of soil per year (or a total of 176,554 tons over the decade) would erode from the 251,100 acres that would otherwise be involved in some aspect of the proposed action. This present amount is not out of line with average erosion rates for the continental United States (see Chapter 2, Soils, Erosion).

8.1.3.2 Mitigating Measures

There would be no mitigating measures.

8.1.3.3 Residual Impacts

Since the erosion that would occur would be natural or geologic, no residual impacts would occur.

8.1.4 Water Resources

8.1.4.1 Environmental Impacts

Water Yield

The water yield from the JSYU would decrease due to the regrowth of vegetation over the lands previously harvested by the present allowable cut. The total decrease would approach 70,934 acre ft. per year, decreasing steadily to background levels after five years. The total decrease due to this alternative would approach 212,802 acre ft. over the 5 years, as a maximum. This would be equivalent to 0.87 per cent of the discharge of the Rogue River (at Agness, Oregon), assuming five average water years. This would not be a significant decrease in total yield.

Water Quality

Impacts to water quality due to this proposal would be primarily limited to a decrease in sediment yield. Cessation of timber harvest activities would result in a gradual decrease in the amount of sediment reaching the streams in the JSYU. The total sediment yield due to the cessation would equal a decrease

of 5,195,439 total tons of sediment over a five year period; this would be approximately 7.8 per cent of the average sediment yield for the same time period on the JSYU.

This would be a significant decrease; however, the present allowable cut is harvesting on 1.3 times the area of the proposal. Since many of the present inventories used to determine the suitability of sites for harvesting were not available at the initiation of the present allowable cut, some fragile sites have probably been harvested. Sediment from such sites has probably exceeded the amount anticipated for the proposal by more than the increased area that has been cut.

8.1.4.2 Mitigating Measures

There would be no mitigating measures.

8.1.4.3 Residual Impacts

Long term effects of cessation of timber harvesting activities would be impossible to predict.

8.1.5 Vegetation

Implementation of Alternative No. 1 would eliminate all the impacts, both beneficial and adverse, of continued timber management in the JSYU. This

does not imply that no changes would occur within the biological environment, however.

Natural succession would continue on those areas previously disturbed by logging as well as on those areas subjected to natural disturbances such as wildfire, windthrow and insect infestation.

8.1.6 Animals

In all probability, cessation of timber harvest would reduce the potential amount of early seral habitat that would have been developed by logging. This cannot be stated with certainty, however, because of the unpredictability of natural disturbances. Similarly, cessation of timber harvest would perpetuate the development of old growth forest communities and their associated faunas. Declines in aquatic habitat conditions due to logging operations would cease and stream conditions would naturally improve unless natural disturbances were sufficient to cause declines.

8.1.6.1 Mitigating Measures

None

8.1.6.2 Residual Impacts

None

8.1.7 Recreation

The cessation of timber management activites would increase the quality of recreational experience for boaters, fisherman, and swimmers. The relatively high quality of undisturbed streams and lakes would appeal to these recreationists so long as their accessibility is unimpeded. Camping, general sightseeing, and miscellaneous use would also be expected to increase.

Recreational opportunities for hunters might decrease if predominant game species populations were to decrease due to reduced food supplies. Some naturalists, birdwatchers, or photographers may also be adversely affected if animal species diversity were reduced as a result of the elimination of the "edge effect" created by cutting practices. Unique habitat or species associated with unharvested forests may create additional opportunities for recreational pursuits. Reduced road construction would eliminate vehicular access to many areas. Opportunities for ORV use and other dispersed recreational use would be decreased.

This alternative would probably be most favorable to those segments of the public which enjoy appreciative-symbolic activities within the forest. These activities include seeing natural scenery, hiking, horseback riding, climbing, birding, nature study, and photography.

8.1.8 Visual Resources

The cessation of clearcutting and other timber management practices would eliminate the creation of a number of sharp visual contrasts. The reforestation of areas recently harvested would eventually erase most of the undesirable characteristics associated with harvested areas. Visual values would not be improved on areas designated as VRM Class V (in need of rehabilitation). Natural succession of plant and tree species would occur over time, and the preponderance of over-mature or old growth stands would be generally pleasing to most forest visitors. Reduced road construction and the elimination of smell, dust, fumes, and smoke from many timber management activities would contribute further to the esthetic values of the forest. On the other hand, timber management practices could not be used to enhance the environment by changing form, line, texture, color, or vegetative groupings. Certain practices (road construction, especially) would no longer benefit the visual resource by providing scenic access, panoramic views, or by focusing attention on specific scenic features.

8.1.9 Wilderness Values

The cessation of timber management activities would allow inclusion of these lands in the wilderness inventory and review process prescribed by FLPMA. The process provides for identification of roadless areas of 5,000 acres or more and roadless islands, with wilderness characteristics. Once such areas are identified, they are reviewed by the Secretary for suitability for wilderness preservation by Congress.

8.1.10 Noise

The cessation of timber management activities would eliminate the noise intrusiveness which results from timber management operations.

8.1.11 Cultural Resources

Decreased accessibility to cultural resource sites as a result of the elimination of road construction and maintenance would help to protect those sites from vandalism and/or partial or total destruction. There would be no chance of unidentified cultural resource sites being damaged by timber management activities.

8.1.12 Socioeconomic

Economic analysis of Alternatives 1, 2, 3, 4, 5 and 8 are based on estimates of timber sales and associated employment, personal income and public revenue. Population impacts will follow the same patterns as timber harvest and employment, as displayed in Chapter 3. Each alternative will be compared with the situation that would exist under the proposed action.

The section regarding socioeconomic impacts presents both short-term and long-term equilibrium. It is important to recognize that socioeconomic impacts are dependent upon levels of timber harvests, and that for "non-equilibrium" levels of harvest during the first decade (i.e., those analyzed as

alternatives four, five, and eight), long-term production of timber is diminished.

Long term and short term should both be reviewed because they have very different impacts.

A guide to interpretation of the economic variables, and to parameters used in estimating economic impacts is provided in the Chapter 3 introductory section 3.3.5.

The socio-economic impacts addressed in Table 8-4 are based on the first decade. Comparisons to the existing situation for the socioeconomic variables are based on the historical situation during the 1973-75 period.

Table 8-2 presents comparisons of each alternative with the proposed action based on the premise that sustained yield is at a long term equilibrium. Long-term equilibrium is achieved at that point in each alternative when the graph of yield becomes level and extends into perpetuity. It reflects the situation after planned harvest is expected to neither increase nor decline. It is the maximum level of harvest that can be perpetually sustained, given the forest development practices and pre- "long run equilibrium" harvest practices associated with the alternative.

To maintain validity of comparisons, all variables e.g. stumpage price and labor/output ratios not within control of the timber management are

Table 8-2

Long-Term Equilibrium Differences in Effect of Timber Management in the JSYU upon Economic Variables, Alternatives 1-5 and 8, Compared to the Proposal[1]

Economic Variable	Units	Proposed Action (1990)	Difference of Proposal from Alternative Number: 1	2	3	4	5	8	Current Management (1973-4-5)
Timber Supply									
Annual BLM Timber Sales (JSYU)	(MMbf)	94	-94	-30	-17	0	-19	-7	32
All Sources (Timbershed)	(MMbf)	562	-68	-22	-13	0	-14	-5	-7
Employment (Direct)									
Timber	(Jobs)	541	-541	-173	-98	0	-109	-40	-344
Forest Development	(Jobs)	42	-42	-10	-10	2	2	-35	-38
Total	(Jobs)	583	-583	-181	-108	2	-107	-75	306
Non-Local	(Jobs)	54	-54	-17	-10	0	-11	-4	47
Employment (Direct & Indirect)									
Josephine Co.	(Jobs)	506	-506	-154	-96	3	-86	-87	222
Percent Total for Josephine Co.	(Percent)	2.4%	-2.4%	-0.7%	-0.4%	0%	-0.4%	-0.4%	2.4%
Total Local	(Jobs)	863	-863	-268	-160	3	-159	-111	453
All Jobs (local & non-Local)	(Jobs)	943	-943	-293	-175	3	-175	-117	522
Local Personal Income (1974 data)	($1,000,000)	18.2	-18.2	5.7	-3.3	0.1	-3.5	-1.8	5.4
Public Finance (O&C Payments)									
JSYU Dependent O&C Payments									
O&C Area	($1,000,000)	9.6	-9.6	-3.1	-1.7	0	- 1.9	-0.7	4.7
S.W. Oregon	"	6.0	-6.0	-1.9	-1.1	0	- 1.2	-0.5	-3.0
Josephine Co. Area	"	1.2	-1.2	-0.4	-0.3	0	-0.3	0.1	-0.6
Douglas Co. Area	"	2.4	-2.4	-0.8	-0.4	0	-0.5	-0.2	-1.2
Tax Rate Equivalence of O&C Payment									
O&C Area	($/$1,000 T.C.V.)	0.27	-0.27	-0.08	-0.05	0	-0.05	-0.02	-0.07
S.W. Oregon	"	1.09	-1.09	-0.35	-0.20	0	-0.22	-0.08	-0.31
Josephine Co. Area	"	1.65	-1.65	-0.53	-0.30	0	-0.33	-0.12	-0.40
Douglas Co. Area	"	1.31	-1.31	-0.42	-0.24	0	-0.27	-0.10	-0.41

1 Alternatives 6 and 7 are not displayed because they have the same effect as alternative one. Long-term equilibrium levels are achieved as follows: during decade two for the proposal and alternatives 1,2,3 and 4: decade five for alternative 5 and decade nine for alternative 8. Unless otherwise noted, harvest from all sources and all projected economic parameters are based on decade 2, centered on the year 1990.

2 Consult the Chapter 3 intrudction to section 3-3.2 for an interpretation of the Economic Variables and key parameters used.

assumed to be the same among alternatives. The time period assumed in selection of the projected parameters is 1990. Most alternatives reach the stable yield level during the second decade after plan adoption. It is projected that economic effects of the altered harvest (first decade) will be realized within 3-5 years after adoption of a plan. The dependent economy would reach this state, at the earliest, during 1982-4.

Parameters used in preparation of the analysis presented in Table 8-3 were projected for 1980, because much of the data prepared by other entities, and used in the analysis, is projected to decennial years. 1980 is the nearest such period to full implementation of the proposal or alternative harvest levels. This imperfect fit will not damage use of Table 8-3 for comparison, however. It leads to overstatement of the size of employment differences and understatement of differences in O&C payments, but the directions of change and relative magnitude of difference among alternatives will remain the same.

Both Table 8-2 and 8-3 are presented at this point to allow reference and more comprehensive understanding as the reader progresses through the economic analysis of each alternative.

In the narrative discussion of relative economic impacts, the base region is the Medford Timbershed as defined in Beuter et al., 1976. In contrast, the tabular presentation in Tables 8-2 and 8-3 compares the economic effect of sales from the entire JSYU, with "totals" for Josephine County only.

Table 8-3

Short-term (first decade), Differences in Impact of Timber Management in the JSYU upon Economic Variables, Alternatives 1-5 and 8, Compared to the Proposal 1/ 2/

Economic Variable 3/	Units	Proposed Action	Differences of Proposal from Alternative Numbered: 1	2	3	4	5	8	Current Management (1973-4-5)
Timber Supply									
Annual BLM Timber Sales (JSYU)	(MMbf)	106	-106	-30	-17	5	8	40	20
All Sources (Timbershed)	(MMbf)	580	-76	-22	-12	3	6	29	NA
Employment (Direct)									
Timber	(Jobs)	695	-695	-197	-112	32	52	262	190
Forest Development	(Jobs)	42	-42	-8	-10	2	2	-35	-38
Total	(Jobs)	737	-737	-205	-122	34	54	227	132
Non-Local	(Jobs)	67	-67	-19	-11	3	5	26	34
Employment (Direct & Indirect)									
Josephine Co.	(Jobs)	631	-631	-173	-107	29	46	160	97
Percent Total for Josephine Co.	(Percent)	3.5%	-3.5%	-1.9%	-0.6%	0.2%	0.3%	0.9%	1.3%
Total Local	(Jobs)	1,091	-1,091	-304	-181	50	80	336	225
All Jobs (local & non-Local)	(Jobs)	1,190	-1,190	-332	-197	55	87	374	275
Local Personal Income (1974 data)	($1,000,000)	20.5	-20.5	-5.8	-3.4	.9	1.5	6.9	3.1
Public Finance (O&C Payments)									
JSYU Dependent O&C Payments									
O&C Area	($1,000,000)	8.2	-8.2	-2.3	-1.3	0.3	0.6	3.0	-3.3
S.W. Oregon	"	5.1	-5.1	-1.5	-0.8	0.2	0.4	1.9	-2.1
Josephine Co. Area	"	1.0	-1.0	-0.3	-0.2	0.0	0.1	0.4	-0.4
Douglas Co. Area	"	2.0	-2.0	-0.5	-0.3	0.1	0.2	0.8	-0.8
Tax Rate Equivalence of O&C Payment									
O&C Area	($/$1,000 T.C.V.)	0.23	-0.23	-0.06	-0.04	0.01	0.02	0.09	-0.03
S.W. Oregon	"	0.93	-0.93	-0.26	-0.15	0.04	0.07	0.07	-0.35
Josephine Co. Area	"	1.43	-1.43	-0.42	0.25	0.04	0.08	0.50	-0.18
Douglas Co. Area	"	1.11	-1.11	-0.31	-0.19	0.06	0.09	0.42	-0.21

1/ Since alternatives 6 and 7 have the same effect as alternative one, they are not displayed
2/ Unless otherwise noted exonomic impacts of the proposal and alternatives are based upon economic parameters projected to 1980 levels.
3/ Consult the introduction to section 3.3.2 for an interpretation of the Economic Variables and for key parameters used.

Timber output and associated employment projections are based upon the JSYU. All estimates of employees per unit volume are based upon the projected 1975-85 situation from Appendix H. Projections in Appendix H are pro-rated to represent only those portions of the JSYU contained in Beuter's Medford Timbershed.

8.1.12.1 Impacts on Timber Sales

Annual timber sales in Alternative 1 would be zero, 106 MMbf below that of the proposed action. This reduction would represent 13 per cent of harvest projected for the Medford Timbershed under the proposed action, 17 per cent when compared to the no action alternative.

8.1.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 737 local jobs fewer than for the proposed action, and 67 jobs less in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 583 local jobs fewer than for the proposed action.

Total Josephine County jobs lost (631) as compared to those attributable to the proposal would represent 3.5 per cent of total employment in Josephine County during the first decade: In the long term the same measure would

decrease 506 and represent 2.4 per cent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would decrease by 20.5 million dollars, 2.7 per cent of total personal earnings in Josephine, Jackson and Douglas Counties during 1974.

8.1.12.3 Impacts on Local Public Finance

During the first decade, annual O&C payment to all counties compared to the proposed action would decrease by 8.2 million dollars, which would represent 0.23 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the JSYU would decrease by 5.1 million. For Josephine and Douglas County the O&C payment and property tax rate equivalence would fall by: 1.0 million and 1.43; and 2.0 million and 1.1, respectively.

8.1.12.4 Mitigating Measures

No mitigation of adverse social and/or economic impacts are proposed.

8.1.12.5 Residual Impacts

Residual impacts are the same as the impacts identified in Chapter 3 and in this section because no mitigating measures will be adopted.

8.2 NO CONTROL OF COMPETING VEGETATION

ALTERNATIVE NO. 2

This alternative is identical to the proposed action except that no attempt would be made to control grass, brush, or hardwood species growing in competition with commercial coniferous tree species. This would eliminate treatments for the control of competing vegetation both prior to reforestation (site preparation) and after young stands become established (stand release).

On high intensity lands the sustainable allowable cut expected to result from this option is 12.58 MM cu.ft. (64 MM bd.ft.), as shown in Figure 8-1, compared to 18.39 MM cu.ft. (94 MM bd.ft.) for the proposed action. With the additional 2.28 MM cu.ft. (12 MM bd.ft.) harvested on low intensity lands, the total planned harvest for Alternative No. 2 would be 14.86 MM cu.ft. (76 MM bd.ft.).

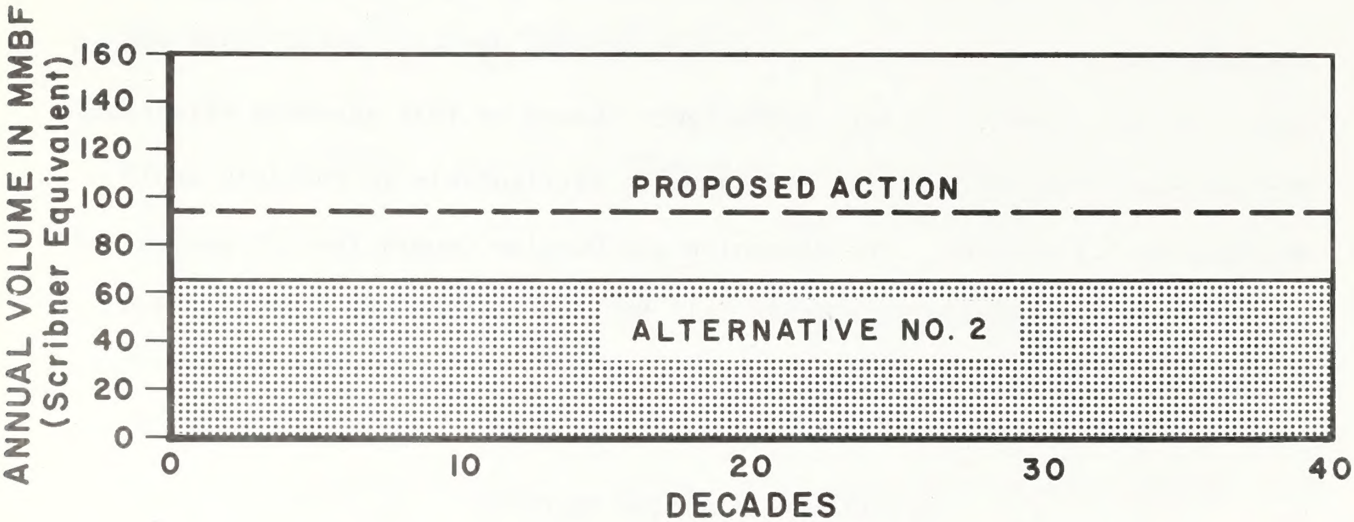


Figure 8-1 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 2
SOURCE: BLM Forest Inventory • 1976

8.2.1 Climate

Areas subjected to the silvicultural practices and construction activities would undergo an increase in temperature extremes, both daily and annually. Daily increases would go from an estimated average of 15 to 20 degrees variation to as much as a 70 degree or greater variation in surface temperature (within 2 inches of the ground surface). Annual variations would increase by as much as 25 degrees, due to exposure to direct sunlight in summer, and radiation cooling and cold air drainage in winter.

Relative humidities in the areas subject to logging would have increases from present ranges of 45 to 95 per cent of saturation to ambient ranges of 20 to 95 per cent of saturation. Increased exposure to wind and connective air movement would cause more evaporation of existing moisture; greater variation in humidity would result. Summer drought conditions would prevail in areas previously protected by forest vegetation to the extent of 73 per cent of the proposed action.

Air movement would increase in the areas subjected to cutting and road construction. Windthrow of trees on margins of cut areas would result in a loss of 7.5 board feet per acre per year.

8.2.2 Air Quality

An increase in particulate pollution would occur during the summer near the logging activities and roads. A total of 78,900 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to the alternative would cause the following amount of increases in pollution: nitrogen oxides, 103 tons/yr.; sulfur oxides, 3.4 tons/ yr.; carbon monoxide, 374 tons/yr.; and particulates, 1.8 tons/yr.

Smoke pollutions would have a minor effect on the visual resource within five miles of individual burning events (slash disposal). In the worst case, a possible 6.4 per cent increase in total particulate pollution would occur due to slash disposal directly related to this alternative.

8.2.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over ten years:

Nitrogen:	108,375 lb
Phosphorus:	36,365 lb
Potassium:	64,328 lb
Calcium & Magnesium:	242,688 lb

Surface disturbance would occur on an estimated 14,374 acres (in the worst case); compaction would occur on 9,065 acres (estimated, in the worst case).

The total amount of erosion for the components of the alternative are estimated as follows:

Yarding and Loading	
Tractor methods	3,217 tons/yr
	8,042 tons total
Cable methods	326 tons/yr
	815 tons total
Transportation System	
New Road Construction	48,912 tons/yr
	122,275 tons total
Reconstruction and maintenance	5,475 tons over ten years

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity.

8.2.4 Water Resources

Water Yield

There would be an increase in the water yield of water from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	18,250 acre ft.
Clearcut	4,380
Other	858
Total	23,488
Yarding and Loading Practices:	
Cable Methods	4,907
Tractor Methods	5,844
Slash Disposal	219
Total	10,970

Transportation System:

New Roads	5,752
Reconstruction	575
Paving	172
Total	6,499
Total for the Alternative:	40,957

This amount would be equal to 0.8 per cent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975; an amount of slight significance to the JSYU.

Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:

Cable Methods	1,075,126 tons
Tractor Methods	857,878
Other	65,700
Total	1,998,704 tons

Transportation System:

New Roads	1,400,547 tons
Reconstruction	121,893
Paving	- 495,579
Total	1,026,861 tons
Total for Proposal	3,025,565 tons

This compares to a total yield of 3,764,811 tons for the proposed action, and 5,195,439 tons for the present allowable cut. This would be a significant reduction.

8.2.5 Vegetation

8.2.5.1 Environmental Impacts

Timber management without the use of herbicides would produce a spectrum of vegetation impacts identical to those discussed for the proposed action except that:

a. Thirty-three per cent less old growth and 35 per cent less mature communities would be destroyed on commercial forest lands over the ten year life of the alternative because the allowable cut would be less.

b. Seral truncation would be less pronounced if no herbicides were applied. Early seral communities could achieve greater development and species diversity. The herbicide hazard to non-target vegetation would be eliminated.

c. Ground disturbance would be less because fewer acres would be subjected to logging and forest development practices. Approximately 43 per cent less alteration of plant habitat or direct injury to plants would occur.

d. The production of commercial wood fiber would be lower because commercial species would not be released from competition with brushy species, grasses and herbs. This lower rate of commercial wood fiber production is reflected in the lower sustained allowable cut level.

e. Approximately 28 per cent fewer trees would require cutting during the first decade.

8.2.5.2 Mitigating Measures

Same as for proposed action.

8.2.5.3 Residual Impacts

All of the non-herbicide related residual impacts discussed for the proposed action would apply if the alternative were implemented.

8.2.6 Animals

8.2.6.1 Environmental Impacts

Timber management without the use of herbicides would produce a spectrum of impacts to wildlife identical to those enumerated for the proposed action except that:

a. About 32 per cent less mature and old growth habitat would be destroyed on high intensity lands over the 10-year life of the timber management plan because the annual allowable cut would be lower. Ultimate elimination of these habitats from commercial forest lands would occur within seven decades if the plan were implemented into perpetuity as compared with five decades for the proposed action.

b. Truncation of early seral habitats would not be as pronounced if no herbicides were applied.

The net impacts to wildlife with the no herbicide alternative as compared with the proposed action would be a lessened adverse impact on old-growth

dependent species and a potentially beneficial impact to wildlife which depend on early seral stages. Although all the old growth and most of the snag habitat would eventually be removed in either case if either management plan were carried into perpetuity, the ultimate elimination of habitat would occur approximately seven decades in the future for Alternative No. 2 as compared with five decades for the proposed action. Therefore, old growth and snag habitat would be available for dependent species for a longer period of time with the no herbicide alternative than with the proposed action.

As discussed in Chapter 3, an objective of timber management is to obtain the early dominance of a cutover site by Douglas-fir and to reduce competition between Douglas-fir and non-commercial plant species by the use of development practices such as herbicide application and fertilization. Exclusion of the use of herbicides would allow the early successional stages to attain their maximum degree of development and, therefore, their maximum potential benefit to dependent wildlife. In addition the exclusion of herbicides would eliminate the threats of toxic TCDD exposure or bioaccumulation in animals.

Elimination of the use of herbicides, by virtue of the associated effect on allowable cut level, would reduce the amount of ground disturbance and therefore reduce the gross amount of sediment which would enter the aquatic environment. Full development of seral communities would also provide additional erosion control so that stream sedimentation would be further reduced. Therefore, the adverse effects of sedimentation on fishes would be reduced

over what they would be with the proposed action. Adverse impacts, however, would not be entirely eliminated.

Elimination of herbicides would also prevent potential impacts to aquatic habitat caused by herbicide runoff or overspray. Declines in aquatic primary productivity would be less likely to occur, and the diversity of aquatic organisms would be better maintained. Other impacts to the aquatic ecosystem would be identical to those discussed for the proposed action.

8.2.6.2 Mitigating Measures

Same as for proposed action.

8.2.6.3 Residual Impacts

Same as for proposed action.

8.2.7 Recreation

8.2.7.1 Environmental Impacts

Impacts would be identical to those of the proposed action except:

a. There would be no danger to the health or safety of recreationists as a result of accidental herbicide spillage or drift.

b. The danger of herbicide-related water pollution affecting fish and fishing success would be nonexistent. A slight increase in visitor-days associated with fishing use would be anticipated (see Table 8-4).

c. Hiking and sightseeing would be more difficult, due to decreased visibility along roads and in the forest without herbicide use. The quality of hiking and sightseeing experiences would decrease. A slight decrease in visitor-days associated with general sightseeing and miscellaneous use would result (see Table 8-4).

d The elimination of helicopter noise and chemfcal smells would improve the quality of recreational experience.

e. The alteration of small, undeveloped pristine areas would total about 19,500 acres (compared to 27,500 acres under the proposed action).

8.2.7.2 Mitigating Measures

Same as those mitigative measures already identified in relation to the proposed action.

8.2.7.3 Residual Impacts

Unavoidable adverse impacts are identical to those included in the proposed action. The quality of hiking and sightseeing experiences may also slightly decrease as a result of some loss of scenic panoramas and overlooks.

8.2.8 Cultural Resources

8.2.8.1 Environmental Impacts

Impacts as a result of implementing this alternative would include all of those delineated as a result of the proposed action.

8.2.8.2 Mitigating Measures

Mitigative measures are the same as those measures identified in the discussion of the proposed action.

8.2.8.3 Residual Impacts

Unavoidable adverse impacts are identical to those identified in the discussion of the proposed action.

8.2.9 Visual Resources

8.2.9.1 Environmental Impacts

Impacts would be the same as those of the proposed action except:

a. Some possibilities to openly view attractive or interesting features, which had been previously screened, may be lost.

b. This alternative would eliminate the possibility of esthetically desirable shrub species being eliminated.

c. The adoption of this alternative would result in 46,700 acres being maintained in a more nearly natural ecological state. By virtue of these areas being less disturbed, would have more visual variety. For example, a mixed stand of hardwood and Douglas fir would be more attractive, with more fall color.

d. In some cases, visual variety would decrease when desired vegetative configurations cannot be developed.

8.2.9.2 Mitigating Measures

Mitigative measures would be the same as those included in the discussion of the proposed action. Additionally, hand slashing, machine clearing, or

fire may be used to mitigate (a) above. Attractive or interesting scenic features can be opened for viewing in other ways than by herbicide application.

8.2.9.3 Residual Impacts

Unavoidable adverse impacts would be identical to those of the proposed action.

8.2.10 Wilderness

8.2.10.1 Environmental Impacts

Same as for proposed action.

8.2.10.2 Mitigating Measures

Same as for proposed action.

8.2.10.3 Residual Impacts

Same as for proposed action.

8.2.11 Noise

8.2.11.1 Environmental Impacts

Impacts would be the same as those of the proposed action except that the noise of helicopters or motorized pressure systems used in the application of herbicides would be eliminated.

8.2.11.2 Mitigating Measures

Same as those listed in the discussion of the proposed action.

8.2.11.3 Residual Impacts

Same as those included in the discussion of the proposed action.

8.2.12 Socioeconomic Conditions

8.2.12.1 Impacts on Annual Timber Sales

Annual sales in Alternative No. 2 would be 30 MMbf below that of the proposed action. Output is 28 per cent below the proposed action and 56 per cent below the existing allowable harvest. This reduction, for the Medford timbershed, represents an eight per cent reduction from the annual harvest projected by Beuter, 4 per cent when compared to the proposed action.

8.1.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 205 local jobs less than with the proposed action, plus 19 jobs fewer in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 181 local jobs less than for the proposed action.

Total Josephine County jobs lost (173) as compared to those attributable to the proposal would represent 1.9 per cent of total employment in Josephine County during the first decade: In the long term, the jobs lost would decline 154 and would represent 0.7 per cent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would increase by 5.8 million dollars, 0.8 per cent of total personal earnings in Josephine, Jackson and Douglas Counties during 1974.

8.2.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would decrease by 2.3 million dollars, which would represent $0.17 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the

JSYU would decrease by $1.5 million. For Josephine and Douglas County the O&C payment and property tax rate equivalence would change by: $0.3 million and $0.42; and $0.5 million and $0.31, respectively.

8.2.12.4 Mitigating Measures

No mitigation of adverse social and/or economic impacts are proposed.

8.2.12.5 Residual Impacts

Residual impacts are the same as the impacts identified in Chapter 3 and in this section because no mitigating measures will be adopted.

8.3 LIMITED INVESTMENT IN TIMBER PRODUCTION

ALTERNATIVE NO. 3

This alternative differs from the proposal in that management practices would be limited to those associated with final timber harvest and artificial reforestation. Planned practices would include road construction, shelterwood harvest and clearcutting, slash disposal, site preparation (with herbicides where warranted), and planting.

On high intensity lands the sustainable allowable cut resulting from this alternative is 15.09 MM cu.ft. (77 MM bd.ft.), as shown in Figure 8-2. The additional 2.28 MM cu.ft. (12 MM bd.ft.) harvested on low intensity lands would bring the total planned harvest for Alternative No. 3 to 17.37 MM cu.ft. (89 MM bd.ft.).

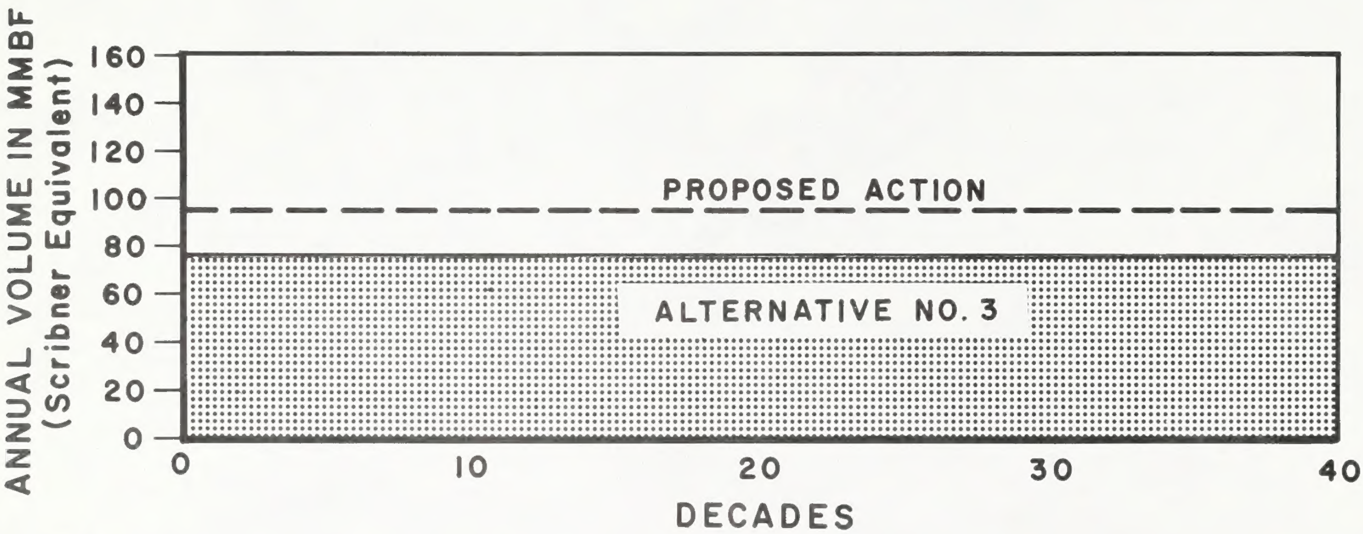


Figure 8-2 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 3
SOURCE: BLM Forest Inventory • 1976

8.3.1 Climate

Impacts to the microclimate would be the same as for Alternative No. 2 except that the summer drought conditions would prevail on 80 per cent of the areas considered under the proposed action.

Windthrow losses would be an estimated 8.0 board feet per acre per year.

8.3.2 Air Quality

Impacts to air quality would be the same as for Alternative No. 2 near the logging activities and roads. A total of 90,400 acres would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following amount of increases in pollution: nitrogen oxides, 113 tons/yr; sulfur oxides, 3.8 tons/yr; carbon monoxide, 412.6 tons/yr; and particulates 6.78 tons/yr.

Smoke pollution impacts would be identical to Alternative No. 2 except that, in the worst case, a possible 7.5 per cent increase in particulate pollution would occur over the JSYU.

The following amounts of herbicide would be estimated to volatilize (to unknown distances) in the worst case under this alternative over ten years:

Diesel oil carrier	12,500 gal.	Round-up	477 lb.
Silvex 2,4,5-TP	680 lb.	Krenite	477 lb.
2,4-D	680 lb.	Atrazine	2,000 lb.
		Dalapon	2,062 lb.

8.3.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over ten years.

Nitrogen:	125,041 lb.
Phosphorus:	41,346 lb.
Potassium:	74,022 lb.
Calcium & magnesium:	279,258 lb.

In the worst case, surface disturbance would occur on 15,788 acres of previously undisturbed lands; compaction would occur on 9,957 acres.

The total amount of erosion of soil due to the components of this alternative are estimated as follows:

Yarding and Loading	
Tractor Methods	3,702 tons/yr.
	6,755 tons total
Cable Methods	374 tons/yr
	937 tons total
Transportation System	
New road Construction	56,280 tons/yr
	140,700 tons total
Reconstruction & Maintenance	6,300 tons over ten years

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

Herbicides entering the soil ecosystem under this alternative would be estimated to approach the following amounts over ten years:

Silvex (2,4,5-TP)	3,469 lb.	Krenite	2,669 lb.
2,4-D	4,136 lb.	Atrazine	44,552 lb.
Round-up	2,268 lb.	Dalapon	22,038 lb.

8.3.4 Water Resources

Impacts to the water resources of the JSYU would be approximately equal to those of Alternative No. 2, with one exception. An unknown amount of various combinations of herbicides used in the alternative would contaminate some of the surface waters; the anticipated amounts would be extremely small, most in ranges too small to be detected by present chemical analytical technology.

8.3.5 Vegetation

8.3.5.1 Environmental Impacts

Alternative No. 3 would entail the same types of impacts as the proposed action with the exceptions that:

a. Approximately fifteen per cent less old-growth and thirteen per cent less mature community would be eliminated during the ten year life of Alternative No. 3 than would be eliminated with the proposed action. If the alternative were implemented into perpetuity, ultimate elimination of mature communities would occur in six decades and elimination of old growth would occur in five decades.

b. Because herbicide spraying would occur on approximately 13,200 fewer acres with this alternative, herbicide impacts to seral community

development would be fewer than with the proposed action. This reduction in treatment area would also reduce the probability of adverse impacts to aquatic plants and non-target terrestrial vegetation from herbicide drainage or overspray. Curtailment of herbicide applications for stand release would reduce the production of commercial wood fiber.

c. Because less volume would be harvested annually, soil would be disturbed less. Less soil disturbance would reduce adverse impacts to plant habitat and would also reduce direct plant injury or mortality.

8.3.5.2 Mitigating Measures

Mitigating measures for Alternative No. 3 would be the same as for the proposed action.

8.3.5.3 Residual Impacts

Same as for the proposed action.

8.3.6 Animals

8.3.6.1 Environmental Impacts

The same types of impacts as identified for the proposed action can be expected, except that impact intensity would differ. Approximately 14 per cent less mature and old growth habitat would be eliminated during the ten

year life of Alternative No. 3 as compared with the proposed action. Therefore, more old growth habitat would remain after one decade's continuance of this alternative than would remain after one decade's continuance of the proposed action. This would reduce the potential short-term impacts to old-growth dependent species.

Implementation of the limited investment alternative would reduce the number of acres for herbicide treatment from 46,700 acres to about 33,500 acres because no herbicide stand release would be undertaken with the alternative. This would reduce the potential adverse impacts which could result to aquatic habitat from herbicide overspray or drainage. The possibility of toxic exposure to TCDD would also be lowered as would the threat of bioaccumulation. Reduction in the acreage to be sprayed would also allow greater development of early seral stage habitat.

8.3.7 Recreation

8.3.7.1 Environmental Impacts

Impacts resulting from the implementation of this alternative would be identical to those of the proposed action with the following exceptions:

a. Elimination of thinning or stand release would mean less alteration of the recreational experience.

b. Fewer areas and opportunities for hiking would be created as a result of the elimination of thinning and stand release. Sightseeing and miscellaneous use would slightly decrease (see Table 8-4).

c. Water quality degradation and related impacts upon fish populations and fishing success would not be as widespread. Fishing use would slightly increase (see Table 8-4).

d. With the elimination of commercial thinning, some hazard trees might remain standing and endanger recreationists.

e. With the elimination of fertilizer application, the possibility of potable water supply contamination or other health hazards would be reduced.

f. With approximately 48,000 acres proposed for harvest under this alternative, we would expect about 24,000 acres to be new ground, previously undisturbed by man, and possessing opportunities for solitude and serenity.

8.3.7.2 Mitigating Measures

Same as for proposed action.

8.3.7.3 Residual Impacts

Same as for proposed action. Reduced opportunities for hiking and existence of more hazard trees are unavoidable adverse impacts associated with this alternative.

8.3.8 Cultural Resources

8.3.8.1 Environmental Impacts

With fewer timber management activities taking place, there would be less chance of unidentified cultural resources being inadvertently damaged or destroyed.

8.3.8.2 Mitigating Measures

Same as for proposed action.

8.3.8.3 Residual Impacts

Same as for proposed action.

8.3.9 Visual Resources

8.3.9.1 Environmental Impacts

The elimination of such activities as fertilizer application, thinning, and stand release would result in a reduced number of short term adverse impacts but might also hinder long-term enhancement affects resulting from changes in form, line, texture, color, and/or vegetative groupings.

8.3.9.2 Mitigating Measures

Same as for proposed action.

8.3.9.3 Residual Impacts

Same as for proposed action with fewer long-term enhancement possibilities.

8.3.10 Wilderness

8.3.10.1 Environmental Impacts

Same as for proposed action.

8.3.10.2 Mitigating Measures

Same as for proposed action.

8.3.10.3 Residual Impacts

Same as for proposed action.

8.3.11 Noise

8.3.11.1 Environmental Impacts

With fewer timber management operations taking place, noise intrusiveness would be reduced.

8.3.11.2 Mitigating Measures

Same as for proposed action.

8.3.11.3 Residual Impacts

Same as for proposed action.

8.3.12 Socioeconomic Conditions

8.3.12.1 Impacts on Annual Timber Sales

Annual timber sales would amount to 17 MMbf less than with the proposed action. Proposed annual sales are 16 per cent below the proposed action and 39 per cent below that of the existing situation. This change represents, for the Medford Timbershed, a 7 per cent reduction from the annual harvest projected by Beuter et al., two per cent when compared with the proposed action.

8.3.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 122 local jobs less than with proposed action, and 11 jobs fewer in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 108 local jobs less than for the proposed action.

Total Josephine County jobs lost (107) as compared to those attributable to the proposal would represent 0.6 percent of total employment in Josephine County during the first decade: In the long term the same decline would be 96 and represent four tenths percent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would decrease by 3.4 million dollars, 0.4 percent

of total personal earnings in Josephine, Jackson and Douglas Counties during 1974.

8.3.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action, would decline by 1.3 million dollars, which would represent 19 cents in property tax rate equivalence (based on 1977 assessed valuation.) For Southwest Oregon counties, O&C payments attributable to the JSYU would decrease by 800 thousand dollars for Josephine and Douglas County the O&C payment and property tax rate equivalence would change by: 200 thousand dollars and 25 cents; and 0.3 million dollars and 18 cents, respectively.

8.3.12.4 Mitigating Measures

No mitigation of adverse social and/or economic impacts are proposed.

8.3.12.5 Residual Impacts

Residual impacts are the same as the impacts identified in Chapter 3 and in this section because no mitigating measures will be adopted.

8.4 UTILIZATION OF SURPLUS INVENTORY

ALTERNATIVE NO. 4

This alternative would direct the sale of the maximum amount of timber possible during the first decade without diminishing the sustainable harvest of 18.39 MM cu.ft. (94 MM bd.ft.) in the decades beyond. The objective would be to assist in meeting anticipated short-run national housing needs and to cushion the effect of the proposed allowable cut reduction.

The allowable cut on high intensity lands for this alternative would be 19.41 MM cu.ft. (99 MM bd.ft.) for one decade, as shown in Figure 8-3. With the additional harvest of 2.28 MM cu.ft. (12 MM bd.ft.) on low intensity lands, the total planned harvest for this alternative would be 21.69 MM cu.ft. (111 MM bd.ft).

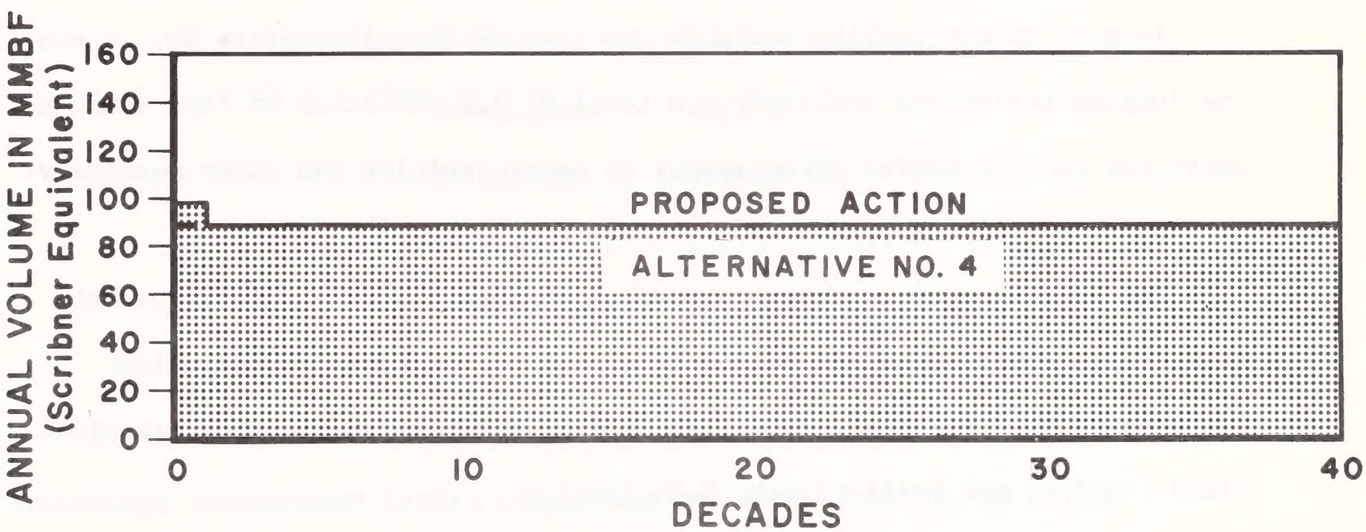


Figure 8-3 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 4

SOURCE: BLM Forest Inventory • 1976

8.4.1 Climate

Impacts to the microclimate would be the same as described for Alternative No. 2 except that summer drought conditions would prevail on 105 percent of the areas considered under the proposed plan.

Windthrow losses would be an estimated 10.5 board feet per acre per year.

8.4.2 Air Quality Impacts

Impacts to air quality would be the same as for Alternative No. 2 near the logging activities and roads. A total of 123,060 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following amount of increases in pollution: Nitrogen Oxides, 148 tons/yr; Sulfur Oxides, 4.9 tons/yr.; Carbon Monoxide, 538.9 tons/yr; and Particulates, 8.86 tons/yr.

Smoke pollution impacts would be identical to Alternative No. 2 except that, in the worst case, a possible 9.8 percent increase in particulate pollution would occur over the JSYU.

The following amounts of herbicides would be estimated to volatilize (to unknown distances) in the worst case in this alternative over ten years:

Diesel Oil Carrier	21,627 gal.	Krenite	825 lbs.
Silvex (2,4,5-TP)	1,176 lbs.	Atrazine	3,460 lbs.
2, 4-D	1,176 lbs.	Dalapon	3,569 lbs.
Round Up	825 lbs.		

8.4.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over ten years:

Nitrogen:	129,159 lb.
Phosphorus:	43,339 lb.
Potassium:	76,665 lb.
Calcium & magnesium:	289,231 lb.

In the worst case, surface disturbance would occur on 21,235 acres of previously undisturbed lands; compaction would occur on 13,392 acres.

The total amount of erosion of soil due to the components of this alternative are as follows:

Yarding and Loading		
Tractor methods:	3,834	tons/yr.
	9,585	tons over four years
Cable Methods:	388	tons/yr.
	970	tons over four years
Transportation System		
New Road Construction	58,290	tons/yr.
	145,725	tons total
Reconstruction & Maintenance	6,525	tons over ten years
Scarification:	28,125	tons over four years

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

Herbicides entering the soil ecosystem under this alternative would be estimated to approach the following amounts over ten years:

Silvex (2,4,5-TP)	5,531 lbs.	Atrazine	31,576 lbs.
2,4-D	6,634 lbs.	Dalapon	30,095 lbs.
Round-up	2,790 lbs.	Diesel Oil	83,400 gal.
Krenite	3,282 lbs.	Carrier	

8.4.4 Water Resources

Water Yield

There would be an increase in the water yield of water from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	21,750 acre ft.
Clearcut	5,220
Other	1,022
Total	27,992
Yarding and Loading Practices:	
Cable Methods	5,848
Tractor Methods	6,964
Slash Disposal	261
Total	13,073

Transportation System:	
New Roads	7,880
Reconstruction	788
Paving	236
Total	8,904
Total for the Alternative:	49,969

This amount would be equal to one per cent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975; an amount of slight significance to the JSYU.

Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:	
Cable Methods	1,281,314 tons
Tractor Methods	1,022,402
Other	78,300
Total	2,382,016 tons

Transportation System:

New Roads	1,400,547 tons
Reconstruction	121,893
Paving	- 495,579
Total	1,026,861 tons

Total for Proposal	3,408,877 tons

This compares to a total yield of 3,764,811 tons for the proposed action, and 5,195,439 tons for the present allowable cut. This would be an insignificant reduction.

8.4.5 Vegetation

8.4.5.1 Environmental Impacts

Alternative No. 4 would have the identical spectrum of impacts as the proposed action with the exception that a greater amount of old growth and mature vegetative communities would be removed from the high intensity lands during the ten-year life of the alternative. The alternative would remove about four percent more old growth and two percent more mature communities than the proposal. If this alternative were continued as projected into future decades, however, all of these communities on the high intensity lands would be eliminated at at the end of the fifth decade of implementation as they would be with the proposal.

More vegetation would be impacted by logging and development practices in the first decade than with the proposed action. Longterm impacts, if either the alternative or the proposed action were continued into perpetuity, would be approximately equal.

Probability of impact to the limited aquatic vegetation on the high intensity lands would continue to be low under this alternative but increased in the first decade due to the additional 5 MM bd. ft. cut annually. The possible impacts would be the same for the proposed action.

Long-term impacts to terrestrial and aquatic vegetation would be approximately equal if either Alternative No. 4 or the proposed action were continued into perpetuity.

Possible impacts to threatened or endangered vascular plant species due to implementation of Alternative No. 4 would be of the same types as listed for the proposed action. Since these impacts can occur only when the subject plants are present on a site affected by timber management activities, probability of impact would increase in the first decade due to the 5 MM bd. ft. increase in annual cut and corresponding increase in logging and development practices. The possibility of herbicide impacts to non-target vegetation would be increased with Alternative No. 4, due to the approximately five per cent greater area of treatment.

In the long term, probability of impact to threatened or endangered vegetation would be the same as for the proposed action until after the fifth

decade. Old-growth reserves on the high intensity lands would be depleted by that time, and while the number of acres cut to produce a given volume of timber may vary, the vegetative communities present on regenerated forest land would have a low probability of including any threatened or endangered species.

8.4.5.2 Mitigating Measures

Mitigating measures would be the same as for the proposed action.

8.4.5.3 Residual Impacts

Residual impacts to all vegetation due to this alternative would be the same as for the proposed action.

8.4.6 Animals

8.4.6.1 Environmental Impacts

Impacts would be identical to the spectrum of impacts in the proposal with the exception that about six percent more old-growth and mature habitat would be removed from high intensity lands during the first ten years than with the proposed action. If this alternative were carried into perpetuity, however, elimination of these habitats from high intensity forest lands would occur at the end of the 5th decade of plan implementation, as would that of the proposed action.

Increased cutting, necessary to provide an additional 5 MM bd. ft. per year would increase ground disturbance over the level of the proposed alternative. This would increase the potential for aquatic habitat damage above the levels anticipated for the proposed alternative. It is not known if the impacts to aquatic organisms would be significantly greater. The approximately five percent greater area of herbicide treatment proposed with the alternative would increase the possibility of annual exposure to lethal TCDD dosage and bioaccumulation.

8.4.6.2 Mitigating Measures

Mitigating measures would be the same as for the proposed alternative.

8.4.6.3 Residual Impacts

Residual impacts would be the same as for the proposed alternative.

8.4.7 Recreation

8.4.7.1 Environmental Impacts

Impacts resulting from the implementation of this alternative would be similar to those of the proposed action with the following exceptions:

a. Forest visitors and recreationists who enjoy viewing old-growth specimens would be more adversely affected by this alternative. A slight reduction

in visitor days associated with general sightseeing and miscellaneous use would occur (see Table 8-4). This alternative calls for the removal of 25 per cent of old growth (versus 24 per cent for proposed action) from high intensity lands during the first decade of this alternative.

b. The increase in timber management activities in the first decade would bring about a slight increase in the magnitude of all impacts of the proposed action. Fishing use would slightly decrease. Increased old-growth harvest would also necessitate additional road construction and would result in the loss of some opportunities to experience solitude and isolation in primitive-type areas. Hunting, camping, and ORV use would slightly increase (see Table 8-4).

c. The destruction of small, undeveloped pristine areas would occur as an estimated 29,000 acres proposed for harvest under this alternative is new ground, previously undisturbed by man.

8.4.7.2 Mitigating Measures

Mitigating measures would be the same as those included in the discussion of the proposed action.

8.4.7.3 Residual Impacts

Unavoidable adverse impacts would be the same as those for the proposed action but to a slightly greater degree during the first decade due to increased timber operations.

8.4.8 Cultural Resources

8.4.8.1 Environmental Impacts

Impacts would be identical to those of the proposed action with the following fundamental differences:

a. The intensified cutting of old growth during the first decade would adversely affect those people who regard specimens of old growth as examples of "living history."

b. Increased timber cutting in the first decade would raise the chance of unidentified cultural resources being inadvertently damaged or destroyed.

8.4.8.2 Mitigating Measures

Same as for the proposed action.

8.4.8.3 Residual Impacts

Unavoidable adverse impacts are the same as those for the proposed action. We would expect the degree of impacts to be slightly greater however.

8.4.9 Visual Resources

8.4.9.1 Environmental Impacts

During the first decade this alternative would result in more landscape alteration and contrast than would be apparent as a result of the proposed action. Impacts identical to those of the proposed action would increase commensurably as cutting is intensified. Forest visitors who extol the virtues and grandeur of old-growth and who enjoy viewing these specimens would be especially prone to adverse impacts during the first decade.

8.4.9.2 Mitigating Measures

Same as those for the proposed action.

8.4.9.3 Residual Impacts

Same as for the proposed action to a slightly greater degree.

8.4.10 Wilderness

8.4.10.1 Environmental Impacts

Same as for proposed action.

8.4.10.2 Mitigating Measures

Same as for proposed action.

8.4.10.3 Residual Impacts

Same as for proposed action.

8.4.11 Noise

8.4.11.1 Environmental Impacts

The impact of noise instrusiveness would be the same but slightly greater during the first decade than those of the proposed action.

8.4.11.2 Mitigating Measures

Same as for proposed action.

8.4.11.3 Residual Impacts

Same as for proposed action.

8.4.12 Socioeconomic Conditions

8.4.12.1 Impacts on Annual Timber Sales

Timber sales would be 5 MM bd. ft. above the level in the proposed action. At this rate, annual sales would be nearly 5 per cent greater than that resulting from the proposed action but 24 per cent below that of the existing situation.

This change represents, for the Medford Timbershed, about 4 per cent of the annual harvest projected by Beuter et al., or a 1/2 per cent increase compared to the proposed action.

The above results are pertinent for the first decade only. From the second decade on, this alternative will have social and economic impacts identical with the proposed action. The reduction in sales at the end of the first decade will be an amount significantly less than the average year-to-year variation during recent history.

8.4.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 34 local jobs more than with the proposed action, and 3 jobs more in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be virtually the same as for the proposed action.

Total Josephine County jobs gained (29) as compared to those attributable to the proposal would represent two tenths per cent of total employment in Josephine County during the first decade: In the long term employment would be the same as for the proposed action.

During the first decade, and compared to that of the proposed action, community personal income would increase by 900 thousand dollars, 0.1 percent of total personal earnings in Josephine, Jackson and Douglas Counties during 1974.

8.4.12.3 Local Public Finance

During the first decade, annual O & C payment to all counties, again compared to the proposed action would increase by 300 thousand dollars, which would represent one penny in property tax rate equivalence (based on 1977 assessed valuation.) For Southwest Oregon counties, O & C payment attributable to the JSYU would increase by 0.2 million. For Josephine and Douglas

County the O & C payment and property tax rate equivalence would increase by: Less than $100,000 and $.03; and $.01 million and $.06, respectively.

8.4.12.4 Mitigating Measures

No mitigation of adverse social and/or economic impacts are proposed.

8.4.12.5 Residual Impacts

Residual impacts are the same as the impacts identified in Chapter 3 and in this section because no mitigating measures will be adopted.

8.5 FORESTRY PROGRAM FOR OREGON

ALTERNATIVE NO. 5

This alternative would direct the sale of 20 million cubic feet (102 MM bd.ft.) from high intensity lands and 2.28 million cubic feet (12 MM bd.ft.) from low intensity lands in the first decade.

A recently published Forestry Program for Oregon (Oregon State Board of Forestry, 1977), asked for certain levels of timber supply from BLM administered forests. Although boundaries of timbersheds, as defined in the publication, and BLM administrative units are different, pro-rata timber production requested from the JSYU is approximately 20 million cubic feet in the first decade. Sequential decadal harvests sought for the second, third and fourth decades are respectively 22.67 million cubic feet (116 MM bd.ft.), 23.46 million cubic feet (120 MM bd.ft.) and 24.63 million cubic feet (126 MM bd.ft.) with continuing harvest level of similar magnitude in future decades.

Assuming 2.28 million cubic feet annual harvest from the low intensity lands, the JSYU could produce timber at the suggested level for the four decades. Thereafter, however, the capacity to continue these cuts would cease since lands allocated to sustained yield timber production (high intensity lands) would then have been reduced to timber stands in the 60-year age class and younger. The sustainable allowable cut from high intensity lands would then be 14.78 million cubic feet (75 MM bd.ft.), as shown in Figure 8-4.

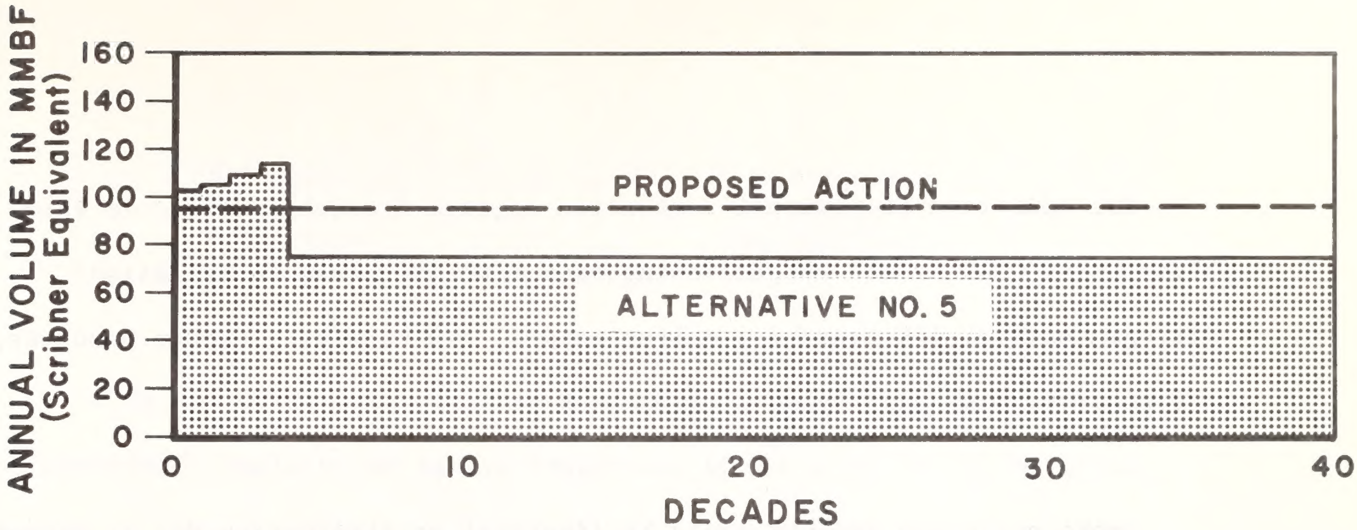


Figure 8-4 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 5

SOURCE: BLM Forest Inventory • 1976

8.5.1 Climate

Impacts to the microclimate would be the same as described for Alternative No. 2 except that summer drought conditions would prevail on 106 per cent of the areas considered under the proposed action.

Windthrow losses would be an estimated 10.6 board feet per acre per year.

8.5.2 Air Quality

Impacts to air quality would be the same as for Alternative No. 2 near the logging activities and roads. A total of 123,960 acres of land would be subject to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following amount of increases in pollution: nitrogen oxides, 149 tons/yr.; sulfur oxides, 5.0 tons/yr., carbon monoxide, 543 tons/yr., and particulates, 8.93 tons/yr.

Smoke pollution impacts would be identical to Alternative No. 2, except that, in the worst case, a possible 9.8 per cent increase in particulate pollution would occur over the JSYU.

The following amounts of herbicides would be estimated to volatilize (to unknown distances) in the worst case in the alternative over ten years:

Diesel oil carrier	21,342 gal.
Silvex (2,4,5-TP)	1,160 lbs.
2,4-D	1,160 lbs.
Round Up	814 lbs.
Krenite	814 lbs.
Atrazine	3,415 lbs.
Dalapon	3,521 lbs.

8.5.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practicies would be estimated to approach the following totals over ten years:

Nitrogen:	176,666 lbs.
Phosphorus:	59,280 lbs.
Potassium:	104,863 lbs.
Calcium and Magnesium:	395,616 lbs.

In the worst case, surface disturbance would occur on 20,776 acres of previously undisturbed lands; compaction would occur on 13,102 acres.

The total amounts of erosion of soil due to the components of the alternative would be as follows:

Yarding and Loading	
Tractor Methods:	5,244 tons/yr.
	13,110 tons over 4 years
Cable Methods:	531 tons/yr.
	1,328 tons over 4 years
Transporation System	
New Road Construction:	67,000 tons/yr.
	167,500 tons total
Reconstruction and Maintenance:	7,500 tons over 10 years
Scarification:	28,125 tons over 4 years

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

Herbicides entering the soil ecosystem under this alternative would be estimated to approach the following amounts over ten years:

Silvex 2,4,5-TP	5,458 lbs.
2,4-D	6,547 lbs.
Round Up	2,753 lbs.
Krenite	3,037 lbs.
Atrazine	31,159 lbs.
Dalapon	29,697 lbs.
Diesel oil Carrier	19,848 gals.

8.5.4 Water Resources

Water Yield

There would be an increase in the water yield of water from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	29,750 acre ft.
Clearcut	7,140
Other	1,398
Total	38,288
Yarding and Loading Practices:	
Cable Methods	7,999
Tractor Methods	9,526
Slash Disposal	357
Total	17,882

Transportation System:

New Roads	7,880
Reconstruction	788
Paving	236
Total	8,904

Total for the Alternative:	65,074

This amount would be equal to 0.8 per cent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975; an amount of slight significance to the JSYU.

Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:

Cable Methods	1,752,602 tons
Tractor Methods	1,398,458
Other	107,100
Total	3,258,160 tons

Transportation System	
New Roads	1,400,547 tons
Reconstruction	121,893
Paving	- 495,579
Total	1,026,861 tons
Total for Proposal	4,285,021 tons

This compares to a total yield of 3,764,811 tons for the proposed action, and 5,195,439 tons for the present allowable cut. This would be a significant difference in total compared to the proposal.

8.5.5 Vegetation

8.5.5.1 Environmental Impacts

The implementation of Alternative No. 5 would intensify all vegetation impacts discussed in Chapter 3. Major differences in impact intensity between this alternative and the proposed action include:

a. Approximately nine per cent more old-growth (200 yrs +) community would be eliminated from high intensity lands during the ten-year life of this alternative than with the proposed action. If either alternative were implemented into perpetuity, ultimate elimination of old growth would occur in the third decade with Alternative No. 5 and the fifth decade with the proposed action. No mature communities (120-190 yrs.)

would be harvested during the ten-year, short-term duration of the alternative, however.

b. A greater amount of soil disturbance would occur during the first decade of Alternative No. 5 than would under the proposal. This would increase the amount of plant habitat alteration as well as the amount of direct injury or mortality to plants.

c. About seven per cent more herbicide and fertilizer application would be necessitated with this alternative. This difference would increase the potential impacts to aquatic plants which would result from herbicide overspray and fertilizer or herbicide drainage.

8.5.5.2 Mitigating Measures

Same as for the proposed action.

8.5.5.3 Residual Impacts

Same as for the proposed action.

8.5.6 Animals

8.5.6.1 Environmental Impacts

Alternative No. 5 would intensify all impacts to animals discussed in Chapter 3. Approximately nine per cent more of the existing old-growth habitat on high intensity lands would be eliminated during the first decade of alternative implementation than if the proposal were implemented. Complete elimination of old-growth habitat would occur in the third decade under this alternative compared with the fifth decade for the proposed action. Therefore, both short-term and long-term impacts to old-growth dependent species would be greater with Alternative No. 5 than with the proposed action. However, no mature (120-190 yrs.) habitat would be removed with the alternative as opposed to approximately 7,000 acres with the proposal.

A greater amount of soil disturbance would occur during the first decade of Alternative No. 5 than would under the proposal. This increased soil disturbance would increase the potential for damage to the aquatic ecosystem via increases in sedimentation. Fertilizer and herbicide run-off potential would also be greater because about seven per cent more area would be treated. Similarly, because of the increased management activity, a greater amount of early seral stage habitat would be available for dependent animal species. The degree of benefit that this habitat would provide cannot be determined because the effects of herbicide treatments and fertilization on carrying capacity have not been documented. Although more early seral habitat

would be available, the effects of herbicide-induced seral truncation would reduce its carrying capacity.

8.5.6.2 Mitigating Measures

Same as for proposed action.

8.5.6.3 Residual Impacts

Same as for proposed action.

8.5.7 Recreation

8.5.7.1 Environmental Impacts

If this alternative were implemented, the first decade would be characterized by a loss of nine per cent more of the existing old growth on high intensity lands than under the proposed action. The following three decades would also be characterized by increased old-growth harvesting. As harvesting and management intensity increases on public land, more alteration of the recreation experience can be expected. This alternative would intensify all of the impacts to recreation resources associated with the proposed action's timber management and road construction activities. Increased harvest would also necessitate extension of the logging road network, reducing the serenity, solitude, and isolation afforded in undisturbed areas. Approximately 29,250

acres of harvested land would be new ground, previously undisturbed by man. While hunting, camping, and ORV use would probably increase, general sight-seeing, fishing, and miscellaneous use reductions would be expected (see Table 8-4).

8.5.7.2 Mitigating Measures

Same as for proposed action.

8.5.7.3 Residual Impacts

Same as for proposed action. Both short-term and long-term impacts to recreation would be greater with this alternative than with the proposed action.

8.5.8 Cultural Resources

8.5.8.1 Environmental Impacts

Increased timber management activity and associated ground surface disturbance would increase the risk of unidentified cultural sites being inadvertently damaged or destroyed. Other impacts associated with the proposed action would also be intensified under this alternative.

8.5.8.2 Mitigating Measures

Same as for the proposed action.

8.5.8.3 Residual Impacts

Same as for proposed action but slightly intensified.

8.5.9 Visual Resources

8.5.9.1 Environmental Impacts

The effects of intensified old-growth harvest would adversely impact those people who appreciate the transcendent beauty of these specimens. Impacts of this alternative would be the same as those for the proposed action but would be intensified.

8.5.9.2 Mitigating Measures

Same as for proposed action.

8.5.9.3 Residual Impacts

Same as for proposed action but intensified.

8.5.10 Wilderness

8.5.10.1 Environmental Impacts

Same as for proposed action.

8.5.10.2 Mitigating Measures

Same as for proposed action.

8.5.10.3 Residual Impacts

Same as for proposed action.

8.5.11 Noise

8.5.11.1 Environmental Impacts

The impacts of noise intrusiveness would be greater during the first four decades as a result of the implementation of this alternative rather than the proposed action.

8.5.11.2 Mitigating Measures

Same as for proposed action.

8.5.11.3 Residual Impacts

Same as for proposed action.

8.5.12 Socioeconomic Conditions

8.5.12.1 Impact on Annual Timber Sales

The annual sales would be 7.5 per cent, 23.4 per cent, 27.7 per cent and 34 per cent above the proposed action for the first decade through the fourth. Sales would be 20 per cent less than under the proposed action for subsequent decades (long term). The average for the first four decades would be 119 MM bf, 22.7 per cent above the proposed action. During the same period, the allowable sales would be 18 per cent less than existing allowable sales.

The level for the first four decades represents a 1 per cent, 3.9 per cent, 4.6 per cent and 6.7 per cent increase over the projected timbershed harvest based on the proposed action, with subsequent timbershed harvest being perpetually 3.3 per cent less than the proposed action would provide.

8.5.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 54 local jobs more than the proposed action, and 5 jobs more in pulp and paper processing elsewhere in

Oregon. For the long-term equilibrium, comparable impacts would be 107 fewer local jobs than for the proposed action.

Total Josephine County jobs gained (46) as compared to those attributable to the proposal would represent 0.3 per cent of total employment in Josephine County during the first decade: In the long term jobs would decrease by 86 less than for the proposal and represent a reduction of four tenths per cent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would increase by 1.5 million dollars, two tenths per cent of total personal earnings in Josephine, Jackson and Douglas Counties during 1974. Based on 1974 earnings, long-term personal income would be $3.5 million less per year.

8.5.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would increase by 500 thousand dollars, which would represent $.02 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the JSYU would increase by less than four hundred thousand dollars. For Josephine and Douglas County the O&C payment and property tax rate equivalence would increase by: $ 100 thousand and $.08; and 200 thousand and $.09, respectively.

8.6 SUBSTITUTE SOURCES

ALTERNATIVE NO. 6

This alternative would relate to the possibilities for increased timber production from non-BLM lands to offset a complete cessation of current BLM timber production in the JSYU. Local environmental impacts would be the same as those in Alternative No. 1, No Timber Management Program based on similar management assumptions.

The three major administrators or owners (other than BLM) of forest land in the vicinity of the JSYU are the U.S. Forest Service, private industry, and private non-industry. Together they control approximately 68 per cent of the commercial timber area in the Medford timbershed which includes Josephine and Jackson Counties (Oregon State Board of Forestry, 1977).

Common to all three ownerships is their capability to offset any loss of BLM production through improved timber utilization. Although considerable progress has been made in this area, logging residues left in the woods, unsalvaged mortality of widely scattered trees killed by fire or other destructive agents, and manufacturing residues which are either burned or discarded account for a considerable loss of wood volume. Any advances in better utilization would result in increases in production from non-BLM lands.

8.6.1 U.S. Forest Service

The national forests comprise approximately 31.8 per cent of the total commercial forest land in the Medford timbershed (Ibid.). The national forests are similar to Bureau-administered forests in terms of species composition and age and in that overmature coniferous stands predominate. As a result, any potential increase in production from these lands could be readily utilized as a substitute for foregone Bureau production in existing structural material and miscellaneous markets.

The national forests may have biological potential for increased timber production if adequate funds and manpower were available to intensify current programs. For any given national forest, the environmental impacts of the individual practices and collective impacts under an intensive timber management program would be similar to those described in the previous chapters.

8.6.2 Private Industry

Forest industries own approximately 14.4 per cent of the total commercial forest land in the Medford timbershed (Ibid). Substantial progress has been made in this sector in raising the level of timber management during recent years as a result of increased funding of reforestation and other silvicultural practices.

While there are some opportunities for further intensification, industry lands are generally at a relatively high level of timber management. However,

industry lands in the JSYU have essentially been depleted of old-growth sawtimber inventories. Because of the foregoing factors, it is improbable that industry lands would be capable of offsetting any reduction in the production of sawtimber from Bureau-administered lands either now or in the near future.

8.6.3 Private Non-Industry

Non-industrial owners hold approximately 21.3 per cent of the commercial forest land in the Medford timbershed (Ibid). These owners consist of farmers, businessmen, housewives, power companies and numerous other occupational groups having widely divergent interests or capabilities to invest funds in timber growing.

In reporting on their objectives in owning forest lands, a national survey indicated that a minority of the non-industrial private owners sampled had timber production as a principal objective. Most owners indicated that recreation, wildlife protection, esthetics or speculation were their primary goals. Most had little interest in making sizable investments in timber growing, and some owners were reluctant to harvest timber. These attitudes are supported by the fact that only a small minority have participated in various assistance programs of federal, state and private agencies to intensify the management of their lands.

A general conclusion drawn from the survey results is that most owners do not consider timber-growing investments to be sufficently profitable. Nonetheless, if the non-timber producing segment of this ownership class could be motivated by increased financial assistance, informational and educational programs, or through changes in the economic situation relative to investment profitability, the potential for production from non-industrial private lands could be increased.

8.7 SUBSTITUTE MATERIALS

ALTERNATIVE NO. 7

This alternative would relate to the substitution of materials other than wood products to offset a complete cessation of BLM timber production in the JSYU. Management assumptions and impact assessments would be the same as those in Alternative No. 1, No Timber Management Program.

The consumption of all major categories of industrial raw materials including wood, mineral and agricultural products has increased since 1900. There have, however, been some substantial shifts in the relative importance of the various materials. For example, between the early 1900's and the mid 1950's there was a decline in the relative importance of timber products with their value falling from about 45 per cent of the industrial raw materials consumed to around 20 per cent. Since the mid 1950's, however, there has been little change with consumption of timber products accounting for about 20 per cent of all industrial raw materials used.

Since the decline in the relative importance of industrial timber products in the first five decades of the century was presumably related to relative price changes, the foregone annual production from BLM administered forests could be expected to result in further slippage in the use of timber products due to increased relative costs and decreased timber production.

Unless offset by increased timber production from other sources, increased substitution by competing materials such as metals, plastics and concrete could be expected to ensue. Considerable substitution of this nature has, of course, occurred in the past. Mineral-based products and steel have made heavy inroads in many traditional wood markets, e.g., the use of plastics for boats, furniture and packaging and, to a lesser extent, steel framing and aluminum siding in housing construction. Technologically, substitute materials could completely replace all current structural uses of wood although the aesthetic values of wood could prove difficult to simulate or replace.

The increased production of many substitute materials to offset timber production from BLM lands could increase the activities and, hence, the environmental impacts associated with mining, extracting and manufacturing processes on air, water and land. Generally, the adverse environmental

impacts stemming from the manufacture of steel, aluminum and concrete products in terms of air and water pollution are of greater magnitude than those resulting from the manufacture of lumber and plywood products. In addition, the consumption of electrical energy to produce such materials as steel, concrete, and aluminum would be increased, thus, adding to the current energy shortage. As an example, one report indicates that 39,620 kilowatt-hours are used to produce a ton of aluminum while 936 kilowatt-hours are used to manufacture a ton of lumber. There are likewise substantial differences in heating and cooling costs between houses built with alternative materials. This same report also indicates that the energy needed to heat a wood frame house is 23 per cent below that required for a masonry house, and 16 per cent less energy is needed for cooling purposes. In view of the costs and capacity for producing energy to manufacture substitutes and the attendant impacts on air, land and water, such differentials as previously mentioned must be considered to be environmentally, economically, and socially significant.

Among other aspects of the question of substitution is the increasing problem of waste disposal. Many substitute materials are not biodegradable, and any additional replacement of highly biodegradable wood products would further aggravate this problem. Finally, the rate of depletion of non-renewable supplies of mineral ores, coal, petroleum and natural gas would be increased with attendant increased dependency on foreign sources for certain of these materials.

8.8 NO ACTION

ALTERNATIVE NO. 8

This alternative assumes continuation of the current level of timber management on the Josephine SYU; that is, continuation of the current allowable cut of 28.63 MM cu.ft. (146 MM bd.ft.) on the present timber management base of 334,500 acres. Implicit in that premise is the biological assumption that 116,000 acres will not regenerate after harvest. The 28.63 MM cu.ft. (146 MM bd.ft.) cut level can be sustained on this basis for nine decades, after which the allowable cut would decline to 17.06 MM cu.ft. (87 MM bd.ft.), as shown in Figure 8-5.

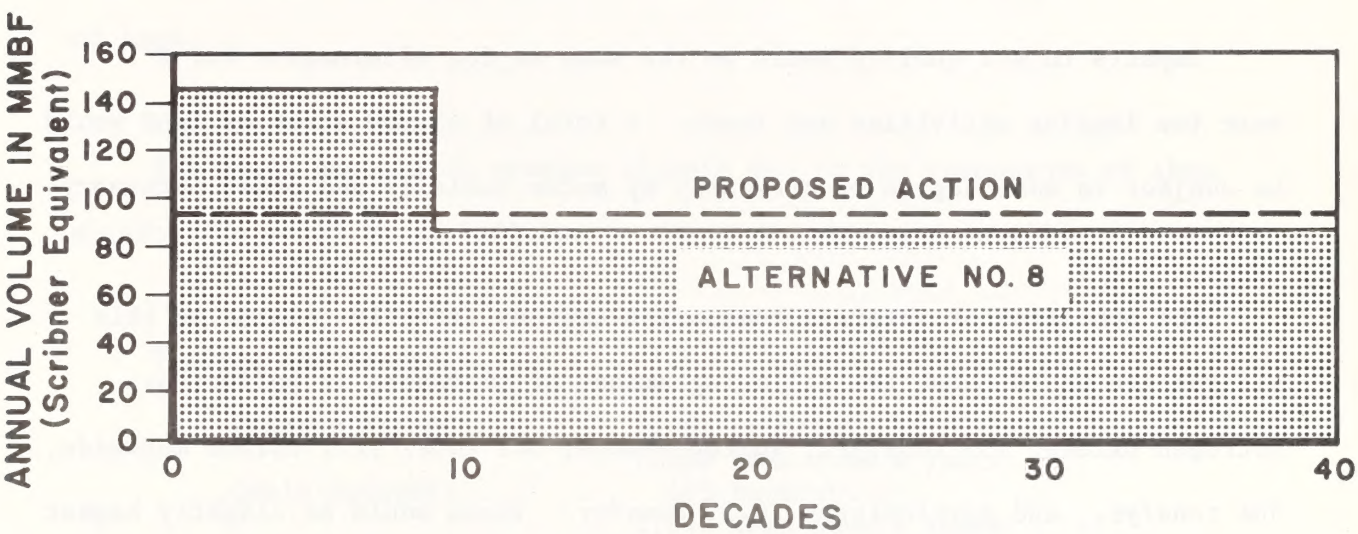


Figure 8-5 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 8
SOURCE: BLM Forest Inventory • 1976

8.8.1 Climate

Impacts to the microclimate would be the same as described for Alternative No. 2 except that summer drought conditions would prevail on 110 per cent of the areas considered under the proposed action.

Windthrow losses would be an estimated 11 board feet per acre per year.

8.8.2 Air Quality

Impacts to air quality would be the same as for Alternative No. 2 near the logging activities and roads. A total of 65,900 acres of land would be subject to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following amount of increases in pollution: nitrogen oxides, 155 tons/yr.; sulfur oxides, 5.2 tons/ yr., carbon monoxide, 564 tons/yr., and particulates, 9.27 tons/yr. These would be slightly higher than those for the proposal, amounts are of slight significance.

8.8.3 Soils

Nutrient losses from the soil of the areas subjected to the silvicultural practices would be estimated to approach the following totals over ten years:

Nitrogen:	204,481 lbs.
Phosphorus:	68,745 lbs.
Potassium:	121,607 lbs.
Calcium and Magnesium:	458,781 lbs.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

In the worst case, surface disturbance would occur on 21,577 acres of previously undisturbed lands; compaction would occur on 13,608 acres of land.

The total amounts of erosion of soil due to the components of this alternative would be as follows:

Yarding and Loading	
Tractor Methods:	6,081 tons/yr.
	15,203 tons over 4 years
Cable Methods:	615 tons/yr.
	1,540 tons over 4 years
Transportation System	
New Road Construction;	67,000 tons/yr.
	167,500 tons/total
Reconstruction and Maintenance	7,500 tons over 10 years

8.8.4 Water Resources

Water Yield

There would be an increase in the water yield of water from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	34,500 acre ft.
Clearcut	8,280
Other	1,622
Total	44,402
Yarding and Loading Practices:	
Cable Methods	9,276
Tractor Methods	11,046
Slash Disposal	414
Total	20,736
Transportation System:	
New Roads	7,880
Reconstruction	788
Paving	236
Total	8,904
Total for the Alternative:	74,042

This amount would be equal to 2.0 per cent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975; an amount of slight significance to the JSYU.

Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:	
Cable Methods	2,032,429 tons
Tractor Methods	1,621,741
Other	124,200
Total	3,778,370 tons
Transportation System:	
New Roads	1,400,547 tons
Reconstruction	121,893
Paving	- 495,579
Total	1,026,861 tons
Total for Proposal	4,805,231 tons

This compares to a total yield of 3,764,811 tons for the proposed action, and 5,195,439 tons for the present allowable cut. This would have severe localized impacts to fragile sites. Significant amounts of sediment would be produced.

8.8.6 Vegetation

8.8.6.1 Environmental Impacts

Alternative No. 8 would have basically the same short-term impacts on vegetation as the proposed action although impact intensity would be greatly increased. Major differences in impact intensity include:

a. Timber harvest would occur on a different land base under the alternative. Much of this additional land base (116,000 acres) has been identified as fragile sites, whereon regeneration would be uncertain. Timber harvest on these lands would therefore alter vegetative productivity for an unknown, but lengthy, period of time.

b. Because no herbicides, burning or fertilization would occur with this alternative, potential impacts associated with these practices would not occur.

8.8.6.2 Mitigating Measures

Same as the mitigative measures included in the proposed action (Chapter 4).

8.8.6.3 Residual Impacts

The additional residual impacts that would accrue from the implementation of Alternative No. 8 instead of the proposed action include:

a. Loss of approximately 39 per cent more of the old-growth community than the proposal on all O&C lands within the JSYU except for those within the Rogue River Corridor and other miscellaneous withdrawn areas (acreage of old growth unknown).

b. Loss of additional endangered species habitat over that which would be lost if the proposal were implemented. The extent of this additional loss cannot be quantified.

8.8.7 Animals

8.8.7.1 Environmental Impacts

Continuation of the present level of cut would result in substantial long-term impacts to terrestrial and aquatic habitats. This alternative would call for timber harvest from all lands except for those withdrawn in the 1970 allowable cut declaration. Because no acreage was specifically withdrawn for the protection of threatened or endangered animals, the no action alternative would eliminate most of the spotted owl habitat in the JSYU.

Approximately 116,000 acres of land would not be expected to regenerate after harvest under this alternative. Excessive sedimentation of aquatic habitats would result.

Approximately 35 per cent (44,315 acres) of old growth (200 yrs+) habitat would be eliminated during the first decade under this alternative.

This compares with 24 per cent (26,617 acres) for the first decade under the proposed action. If Alternative No. 8 were implemented into perpetuity virtually all the old growth habitat, except for that remaining in the Rogue River Corridor, would be eliminated by the fourth decade as compared with the fifth decade if the proposed alternative were implemented.

8.8.7.2 Mitigating Measures

Same as the mitigating measures not included in the proposed action (Chapter 4).

8.8.7.4 Residual Impacts

The residual impacts that would result from the implementation of Alternative No. 8 for a 10-year period include:

a. Loss of approximately 35 per cent of the old-growth habitat on all O&C lands within the JSYU except for those within the Rogue River Corridor and other miscellaneous withdrawn areas (acreage of old growth unknown).

b. Reduced productivity or possible loss of an unknown amount of cold water fish habitat due to increased sedimentation, increased water temperatures and alteration of stream flows.

c. Loss of virtually all of the spotted owl (threatened status - Oregon Department of Fish & Wildlife list) habitat on O&C lands within JSYU.

d. Elimination of habitat productivity on approximately 4,400 acres of land that would be dedicated to roadways.

8.8.8 Recreation

8.8.8.1 Environmental Impacts

Continuing the current level of timber harvest in the JSYU would result in a number of adverse impacts for recreationists. Impacts would be similar to those for the proposed action but would be intensified significantly. Severe degradation of the recreational experience and limitation of quality recreational opportunities would be the outcome of this alternative's implementation. The adoption of this alternative would preclude the proposed action's land withdrawals for potential recreation opportunities. Also, some opportunity for serenity and isolation would be lost as continuation of this harvest level would necessitate the construction of roads into a greater number of small unroaded primitive-type areas than anticipated under the proposed action. Hunting, camping, and ORV use would probably increase slightly, while general sightseeing, fishing, and miscellaneous use would decrease (see Table 8-4). During the first decade 35 per cent of the old growth would be harvested (compared to 24 per cent under the proposed action).

The destruction of small, undeveloped pristine areas would be most apparent under this alternative. Approximately 32,800 acres of land proposed for timber harvest would be new ground, previously undisturbed by man.

8.8.8.2 Mitigating Measures

Same as for proposed action.

8.8.8.3 Residual Impacts

Unavoidable adverse impacts would be the same as for the proposed action but would be significantly greater during the first nine decades.

8.8.9 Cultural Resources

8.8.9.1 Environmental Impacts

Continuing at the present level of timber harvest on the JSYU would increase the chance of unidentified cultural sites being inadvertently damaged or destroyed. Impacts on cultural resources are essentially the same as those for the proposed action but to a greater degree.

8.8.9.2 Mitigating Measures

Same as for proposed action.

8.8.9.3 Residual Impacts

Same as for proposed action but to a greater degree.

8.8.10 Visual Resources

8.8.10.1 Environmental Impacts

Maintaining the current level of allowable timber harvest on the JSYU during the first nine decades would increase all those impacts similarily attributable to the proposed action.

8.8.10.2 Mitigating Measures

Same as for proposed action.

8.8.10.3 Residual Impacts

Same as for proposed action but more intensified during the first nine decades. Implementation of this alternative would result in a number of unavoidable adverse impacts to visually sensitive areas which would have been protected in the proposed action.

8.8.11 Wilderness

8.8.11.1 Environmental Impacts

O&C Lands within the commercial forest land base with potential for designation as primitive areas would be harvested. No opportunity for study of the feasibility for designation would be available.

8.8.11.2 Mitigating Measures

None possible.

8.8.11.3 Residual Impacts

Loss of all areas which could be designated for management under primitive area criteria.

8.8.12 Noise

8.8.12.1 Environmental Impacts

Noise intrusiveness would be much more severe during the first nine decades than under the proposed action.

8.8.12.2 Mitigating Measures

Same as for proposed action.

8.8.12.3 Residual Impacts

Same as for proposed action but more severe.

8.8.13 Socioeconomic Conditions

8.8.13.1 Impacts on Annual Timber Sales

Annual timber sales exceed that of the proposed action by 38 per cent in the first decade and 55 per cent for the subsequent eight decades. Total sales for the timbershed will be increased by 5 per cent above the proposed action until the tenth decade. Then sales would be perpetually 7.5 per cent less than with the proposed action, which is an approximate 1 per cent decline for the timbershed.

8.8.13.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 227 local jobs more than for the proposed action, and a 26 job increase in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 75 less.

Total Josephine County jobs (160) as compared to those attributable to the proposal would be an 0.9 per cent supplement to total employment in Josephine County during the first decade: In the long term the same difference would become -87 and represent a reduction of 0.4 per cent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would increase by 6.9 million dollars, 0.9 per cent of total personal earnings in Josephine, Jackson and Douglas Counties during 1974.

8.8.13.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would increase by 3 million dollars, which would represent $.09 in property tax rate equivalence (based on 1977 assessed valuation.) For southwest Oregon counties, O&C payments attributable to the JSYU would increase by $1.9 million. For Josephine and Douglas County the O&C payment and property tax rate equivalence would change by: $400 thousand and $.50; and 0.8 million dollars and $0.42, respectively.

8.8.13.4 Mitigating Measures

No mitigation of adverse social and/or economic impacts are proposed.

8.8.13.5 Residual Impacts

Residual impacts are the same as the impacts identified in Chapter 3 and in this section because no mitigating measures will be adopted.

Table 8-4

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Climate									
Losses Due to Windthrow	bd.ft./ac./yr.	11.0	10.0	-2.5	-1.1	+0.5	+0.6	+1.0	Amounts are strongly influenced by storms
Air Quality									
Particulate Pollution Due to Operation of Internal Combustion Engines:									
Nitrogen Oxides	tons/yr.	155	141	-27	-28	+7	+8	+14	Amounts are qualitative and should be compared accordingly
Sulfur Oxides	tons/yr.	5.2	4.7	-0.9	-0.9	+0.2	+o.3	+0.5	
Carbon Monoxide	tons/yr.	564	513.2	-97.5	-100.6	+25.7	+29.8	+50.8	
Particulates	tons/yr.	9.3	8.4	-1.6	-1.6	+0.5	+0.5	+0.9	
Particulate Pollution Due to Smoke	tons/cubic mi.	0	0.101	-0.032	-0.014	+0.006	+0.007	-0.101	Amounts are compared to totals for SW Oregon
Voltilization of Herbicide:									
Diesel Oil Carrier	Gal.	0	20,000	-20,000	-7,500	+1,627	+1,342	-20,000	Based on a set of ideal constant environmental conditions during application; amounts are qualitative
Silvex (2,4,5-TP)	lb.	0	1,088	-1,088	-408	+88	+72	-1,088	
2,4-D	lb.	0	1,088	-1,088	-408	+88	+72	-1,088	
Round-up	lb.	0	763	-763	-286	+62	+51	-763	
Krenite	lb.	0	763	-763	-286	+62	+51	-763	
Atrazine	lb.	0	3,200	-3,200	-1,200	+260	+215	-3,200	
Dalapon	lb.	0	3,300	-3,300	-1,238	+269	+221	-3,300	
Soils									
Nutrient Losses:									
Nitrogen	lb.	204,481	148,459	-40,084	-23,418	+19,300	+28,207	+56,022	Calculated from experimental forest results
Phosphorus	lb.	68,745	49,815	-13,450	--8,469	-6,476	+9,465	+18,930	
Potassium	lb.	121,607	88,121	-23,793	-14,099	-11,456	+16,742	+33,486	
Calcium & Magnesium	lb.	458,781	332,450	-89,762	-53,192	-43,219	+63,166	+126,331	
Surface Disturbance	acres	21,577	19,637	-5,263	-3,849	+1,598	+1,139	+1,940	Estim. based on research data
Soil Compaction	acres	13,608	12,384	-3,319	- 2,427	+1,008	+718	+1,224	Estim. based on research data
Erosion Due to Tractor Yarding	tons	13,110	4,407	+3,635	+2,348	+5,178	+8,703	+10,796	Estim. based on research data
Erosion Due to Cable Yarding	tons	1,328	1,116	-301	-179	-146	+212	+424	Estim. based on research data
Erosion Due to Road Construction	tons	167,500	167,500	0	0	0	0	0	Estim. based on research data

Table 8-4 (Continued)

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Erosion Due to Reconstruction & Maintenance	tons	7,500	7,500	no change	no change	no change	no change	no change	A constant environmental cost of road maintenance
Herbicides Entering the Soil Ecosystem:									
Silvex (2,4,5-TP)	lb.	0	5,115	-5,115	-1,646	+416	+343	-5,115	Amounts are estimates and should be compared qualitatively
2,4-D	lb.	0	6,135	-6,135	-1,999	+499	+412	-6,135	
Round-up	lb.	0	2,580	-2,580	-312	+210	+173	-2,580	
Krenite	lb.	0	3,035	-3,035	-366	+247	+2	-3,035	
Atrazine	lb.	0	29,200	-29,200	-4,648	+2,376	1,959	-29,200	
Dalapon	lb.	0	27,830	-27,830	-6,792	+2,265	1,867	-27,830	
Diesel Oil Carrier	gal.	0	83,400	-83,400	-74,234	no change	-63,552	-83,400	
Water Resources									
Water Quality	tons sediment yield	4,805,231	3,764,811	-739,246	-739,246	-355,934	+520,210	+1,040,420	
Water Yield	acre feet	74,042	51,500	-10,543	-10,543	-1,531	+13,574	+22,542	
Terrestrial Vegetation									
Death of Commercial Trees	trees/decade	228,000	164,000	-46,000	-25,000	+10,000	+15,000	+64,000	Number of trees based on volume/tree
Initiation of Secondary Succession	acres	65,600	55,000	-16,000	-7,200	+2,800	+3,300	+10,600	Acreage based on Ac. harvested
Elimination of Mature Communities	acres	0	6,800	-2,200	-1,000	+391	-6,800	-6,800	
Elimination of Old-Growth Communities	acres	44,000	27,000	-8,400	-3,800	+1,500	+9,600	+17,000	
Alteration of Community Longevity	max.age attainable	80	80	no change	no change	no change	no change	no change	Assumes maximum commercial age = 80 years
Destruction of Surface Vege.	acres	13,300	25,400	-11,000	-12,200	-6,100	-5,800	-12,100	Increase is indication of higher intensity mgmt.
Alteration of Plant Habitat	acres	65,600	55,000	-16,000	-7,200	+2,800	+3,300	+10,500	

Table 8-4 (Continued)

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Complete Elimination of Plant Habitat	acres	4,400	4,400	no change	no change	no change	no change	no change	Equal to the acreage occupied by roads
Change in Community Structure	acres	65,600	55,000	-16,000	-7,200	+2,800	+3,300	+10,500	Based on acreage harvested
Seral Truncation	years	1	1	no change	no change	no change	no change	no change	Impact tied mainly to planting and development
Herbicide-Induced Reduction of Non-conifer Productivity	acres	0	47,700	-47,700	-18,100	+2,400	+3,300	--	
Increased Productivity for Conifers	% increase	unknown	unknown	unknown	unknown	unknown	unknown	unknown	Impact tied to proposed development practices & stand regulation
Destruction of Endangered Species	No. species	unknown	unknown	less	less	greater	greater	greater	
Herbicide-Induced Mutagenesis	No. species impacted	none	unknown	none	less	more	more		
Aquatic Vegetation									
Plant Habitat Displacement from Bridges	perennial stream mi.	7.2	7.2	no change	no change	no change	no change	no change	
and Culverts	Intermittent stream mi.	10.7	10.7	no change	no change	no change	no change	no change	
Other Community Changes	--	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Terrestrial Animals									
Increase in Early Seral Habitat	acres	73,500	67,200	-16,100	-7,000	+3,100	+3,600	+6,300	
Truncation of Seral Habitat	Affect on animals	unknown	unknown	unknown	unknown	unknown	unknown	unknown	Impact tied to planting and development practices
Decrease in Mature & Old-Growth Habitat	acres	44,300	33,400	-16,100	-7,000	+3,100	+3,600	+6,300	
Small Mammals Benefitted by Seral Changes	% species Table 2-15	14	14	no change	no change	no change	no change	no change	Table 2-15 not inclusive of all species in JSYU
Small Mammals Unaffected by Seral Changes	% species Table 2-15	65	65	no change	no change	no change	no change	no change	

Table 8-4 (Continued)

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Small Mammals Adversely Affected by Seral Changes	table 2-15	21	21	no change	no change	no change	no change	no change	
Non-Game Birds Benefit-ted by Seral Changes	% species table 2-16	24	24	no change	no change	no change	no change	no change	Table 2-16 not inclusive of all species in JSYU
Non-game Birds Unaffect-ed by Seral Changes	% species table 2-16	48	48	no change	no change	no change	no change	no change	
Non-Game Birds Adversely Affected by Seral	% species table 2-16	28	28	no change	no change	no change	no change	no change	
Enhanced Potential Deer Carrying Capacity	acres	73,500	67,200	-16,100	-7,000	+3,100	+3,600	+6,300	Based on acreage harvested & natural successional changes over ten years
Enhanced Potential Elk Use	acres	73,500	67,200	-16,100	-7,000	+3,100	+3,600	+6,300	Same as above
Enhanced Potential Blue Grouse & Mountain Quail Habitat	acres	73,500	67,200	-16,100	-7,000	+3,100	+3,600	+6,300	Same as above
Changes in Invertebrate Diversity	diversity index	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Decline in Potential Spotted Owl Habitat	acres	44,300	33,400	-16,100	-7,000	+3,100	+3,600	+6,300	Based on elimination of mature and old growth communities
Impacts to Reptiles & Amphibians	no. species impacted	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Increases in Animal Stress	no. species susceptible	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Permanent Displacement of Habitat	acres	4,400	4,400	no change	no change	no change	no change	no change	Equal to the acreage displaced by roads
Lethal Exposure to Herbicides	no. animals	0	unknown	unknown	unknown	unknown	unknown	unknown	
TCDD Bioaccumulation	no. animals	0	unknown	unknown	unknown	unknown	unknown	unknown	
Herbicide Carrier Toxicity	no. animals affected	0	unknown	unknown	unknown	unknown	unknown	unknown	
<u>Aquatic Animals</u>									
Physical Habitat Alterations	stream mi.	unknown	unknown	unknown	unknown	unknown	unknown	unknown	

Table 8-4 Continued

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Biological Habitat Alterations	stream mi.	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Mechanical Displacement of Physical Habitat by Structures	stream mi.	7.2	7.2	no change	no change	no change	no change	no change	Equal to the number of stream miles occupied by calverts
Toxic TCDD Dosage	no. fishes affected	0	unknown	unknown	unknown	unknown	unknown	--	
TCDD Bioaccumulation	no. species susceptible	0	unknown	unknown	unknown	unknown	unknown	--	
Fertilizer-Induced Nutrient Enrichment	stream miles affected	0	unknown	unknown	unknown	unknown	unknown	--	
Cultural Resources									
Damage to Unidentified 1/ Cultural Resources Sites	expected degree of damage and knowledge LDST	+5	+2	+2	+1	+3	+4	+5	
Site Accessibility and Resultant Vandalism and/ or Destruction 1/	state of accessibility	+3	+2	+3	+3	+3	+3	+3	
Visual Resources									
Creation of Visual Contrast 1/	contrasts created	+5	+3	+2	+2	+4	+4	+5	
Recreation									
Decreased Quality of Recreation Experience 1/	loss of opportunity to achieve desired experiences or expected consequences.	+5	+2	+3	+1	+3	+4	+5	
Hazardous Conditions for Recreationists 1/	state of activties endangering endangering recreationists	+5	+3	+2	+3	+3	+4	+5	
Hunting Use 2/	hunter days	23,050	35,450	No Change	No Change	+3,050	+5,550	+11,260	Based upon yearly average 1970-75.

Table 8-4 Continued

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Camping Use (Non-Rogue) 2/	visitor days	9,800	13,510	No Change	No Change	+990	+1,990	+4,330	Based upon FY 1974 Use Data
ORV Use 2/	visitor days	16,300	21,240	No Change	No Change	+2,260	+3,760	+6,880	Based upon FY 1974 Estimated Use Data
General Sightseeing Use 2/	visitor days	217,300	491,360	-41,360	-41,360	-26,360	-61,360	-95,870	Based upon 1974 Use Data
Fishing Use 2/	visitor days	12,100	30,570	+1,930	+2,430	-2,570	-5,070	-9,760	Based up 1976 Estimated Used Data
Miscellaneous Use 2,3/	visitor days	8,500	18,165	-1,665	-1,665	-2,665	-3,165	-3,545	Based up 1976 Estimated Use Data
Destruction of Small, Undeveloped Pristine Areas	acreage harvested	32,800	27,500	-8,000	-3,500	+1,550	+1,750	+5,300	Based upon the assumption that each year 50% of the cut will be on new ground, previously undisturbed by man.
Noise									
Noise Intrusiveness 1/	degree	+5	+2	+1	+1	+3	+4	+5	
Socioeconomic 4/									
Annual JSYU Timber Sold	MM bd.ft.	126	106	-30	-17	+5	+8	+8	For existing situation data are based on actual harvest during 1973-74-75 (average)
Timber Supply - Medford Timbershed	MM bd.ft.	555	580	-22	-12	+3	+6	+29	Based on Beuter projections for Jackson & Josephine Co. - 1973-74-75 is actual harvest.
Josephine Co. - JSYU-Related Jobs	jobs	728	631	-173	-107	+29	+46	+160	Total (direct & indirect) employment attributed to JSYU timber harvest and forest development.
Percent of All Josephine Co. Jobs	percent	4.8%	3.5%	-1.9%	-0.6%	+0.2%	+0.3%	+0.9	Josephine Co. - JSYU - Related jobs divided by total historic or projected employment.
All JSYU Timber Related Jobs	jobs	1,465	1,190	-332	-197	+55	+87	+374	Includes Josephine Co., Douglas Co., and Jackson Co. Coarse residue related employment is elsewhere in Oregon.

Table 8-4 Continued

Comparison of Short Term Impacts for Major Resource Components

Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 2	No. 3	No. 4	No. 5	No. 8	Remarks/Assumptions
				As Compared to Proposed Action					
Local Personal Income	$ Million	23.6	20.5	-5.8	-3.4	+0.9	+1.5	+6.9	Income relationships are based on 1974 relationships and price levels.
Local Population	1,000 persons	3.8	3.1	-0.9	-0.6	+0.2	+0.2	+1.1	Local jobs x 2.86
O&C Payments - JSYU	$ Million	4.85	8.2	-2.3	+1.3	+0.3	+0.6	+3.0	Based on average stumpage price /M bf existing or projected for years of harvest: 1973-74-75, $77/M bf.; Proposal $154/M bf.
Property Tax Rate Equivalence of O&C Payments:									
O&C Area	$ /$1,000	0.20	0.23	-0.06	-0.04	+0.01	+0.02	+0.09	O&C payments divided by assessed value of property within county.
Josephine	$ /$1,000	1.25	1.43	-0.42	-0.25	+0.04	+0.09	+0.50	
Douglas	$ /$1,000	0.90	1.11	-0.31	-0.19	+0.06	+0.09	+0.42	
Jackson	$ /$1,000	0.65	0.75	-0.21	-0.12	+0.04	+0.06	+0.28	

Footnotes:

1/ In the case of unknown variables, numerical weights of 1 to 5 have been assigned to impacts to present comparability between impacts of the proposed and alternative actions. These weightings are not proportional ratings, but merely represent degrees of adverse impact with a weight of 5 representing the alternative from which the most impact will accrue.

2/ 1990 demand projections are based upon a high estimate that demand will increase by 103% over 1970 demand. Visitor day and hunter day analyses are based upon professional judgement as to how impacts discussed in the narrative will affect recreational activities. Because of the range which these projections could take, they are not absolute and have been presented for comparability only. They are also presented as worst case situations.

3/ Includes snow play, collecting, sightseeing other than general sightseeing (historical, botanical, wildlife, geological), incidental hiking, camping, and picknicking in underdeveloped areas.

4/ Socioeconomic Variables - For additional detail on interpretation or estimating procedure, see section 3.3.2.

9. CONSULTATION AND COORDINATION

From the very beginning of the planning system in the Josephine Sustained Yield Unit, Medford District sought public input through various means as outlined below. A full record of all public participation is available for review in the Medford District Office.

The Medford District made contact dealing with the management framework plan with local groups and officials. Public meetings and workshops were held and field tours conducted. Primary documents utilized in writing this environmental statement were the planning systems sections prepared in Medford District which reflect the public participation received.

Preparation of this statement was undertaken by a team of specialists in the Oregon State Office of BLM. Specialties represented on the team, or available for consultation, included forestry, wildlife, watershed management, geology, recreation, landscape architecture, sociology, soils, hydrology, economics, land use planning, fisheries and archeology.

Public media, government and private agencies, industrial groups and others were the recipients of several information documents dealing with the ES. These included correspondence, news releases and copies of the preparation plan. Oregon media coverage consisted of two wire services, 20 daily newspapers, 52 weeklies, 16 television stations, 62 radio stations and 50 special interest

periodicals. Several northern California media outlets with interest in timbering were also on the mailing list.

In all, exclusive of the media, some 500 others were kept informed of the progress on the management framework plan, timber management plan and environmental statement for the JSYU.

Not including other BLM units, this exhaustive mailing list consisted of:

- Two U.S. Senators and four Congressmen.
- Nine bureaus and agencies in the Department of the Interior.
- Ten supervisors and rangers in the U.S. Forest Service.
- Ten other Federal agencies.
- The governor of Oregon, nine members of the legislature and thirteen state agencies.
- Nineteen units of local government at the city, county and district level.
- Advisory groups, most notably the O&C Multiple Use Advisory Board.
- Institutional, professional and intergovernmental agencies, chambers of commerce and regional governments.
- Lumber and timber industry organizations totaling 31 companies and spokesmen.
- Sixteen individuals and organizations with mining interests.
- Two livestock industry associations and fourteen granges.
- The many businesses and clubs with interest in recreation uses in the JSYU. Contacts in this category totaled 68, with heavy emphasis on Rogue River outfitters.

-- Three utility companies.

-- Seven universities and colleges.

-- Thirty-nine groups with an interest in the conservation of the natural environment.

-- Fifty-three individual citizens.

Copies of this draft environmental statement will be available for public inspection at the following BLM offices:

Washington Office of Public Affairs
18th and C Streets
Washington, D.C. 20240
Phone: (202) 343-5717

Oregon State Public Affairs Office
729 N.E. Oregon Street (P.O. Box 2965)
Portland, Oregon 97208
Phone: (503) 234-3361

Medford District Office
310 W. Sixth Street
Medford, Oregon 97501
Phone: (503) 779-2351

Public hearings will be held in Grants Pass and Salem, Oregon, on the adequacy, completeness and accuracy of this environmental analysis. The hearings will not address the advantages or disadvantages of the proposed action. But opinions are and will be solicited on the quality of the analysis. Details for the hearings will be published in the Federal Register and local news sources.

APPENDICES

A. Additional Authorities

B. BLM Form 5450-3, Contract for Sale of Timber

C. Visual Resource Management Classes

D. Soils of the JSYU -- Their Properties and Interpretations

E. Water Resources: Mean Monthly Discharges and Annual Yields, Major Streams

F. Paleontology Exhibits

G. Present Water Quality Standards (Excerpts)

H. Employment Impacts in the Medford Timbershed Associated With BLM Harvesting Alternatives in the JSYU

I. Per Capita and Total Personal Income by Major Sources, 1970-75

L. Literature Cited

T. Glossary of Terms

APPENDIX A

ADDITIONAL AUTHORITIES

Materials Sales Act of 1947, as amended (30 U.S.C. 601 et.seq.)
Taylor Grazing Act of 1934, as amended (43 U.S.C. 315)
Federal Water Pollution Control Act (33 U.S.C. 1251-1376)
Clean Air Act (42 U.S.C. 1857-1857*l*)
Fish and Wildlife Coordination Act (16 U.S.C. 661-666c)
Bald and Golden Eagles Protection Act (16 U.S.C. 668-668d)
Federal Environmental Pesticide Control Act of 1972 (7 U.S.C. 136-136y)
Endangered Species Act of 1973 (16 U.S.C. 1531-1543)
National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n)
Historic Sites Buildings and Antiquities Act (16 U.S.C. 461-467)
Safe Drinking Water Act (42 U.S.C. 300f-300; -9)
Noise Control Act of 1972 (42 U.S.C. 4901-4918)
Solid Waste Disposal Act (42 U.S.C. 3251-3259)
Antiquities Act (16 U.S.C. 431, 432, 433)
Executive Order 11593 (16 U.S.C. 470)
Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)
Recreation and Public Purposes Act (43 U.S.C. 869, 869-4)

This list is illustrative and not necessarily comprehensive, although major laws are included.

APPENDIX B

BLM Form 5450-3

Contract For Sale of Timber

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

No. TS

CONTRACT FOR THE SALE OF TIMBER

LUMP SUM SALE

THIS CONTRACT is made and entered into the day of , 19 , under the authority of the Act of August 28, 1937, (50 Stat. 874), as amended, (43 U.S.C. Sec. 1181a–f), relating to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands, or under the Act of July 31, 1947, (61 Stat. 681), as amended, (30 U.S.C. Secs. 601–604), relating to other lands under the jurisdiction of the Bureau of Land Management, and the regulations as set forth in 43 CFR Group 5400, between the UNITED STATES OF AMERICA, hereinafter called the Government, acting through the Bureau of Land Management, and

of ,

hereinafter called the Purchaser.

WITNESSETH, That the parties hereto do mutually agree as follows:

Sec. 1. *Timber Sold.* The Government hereby sells to the Purchaser and the Purchaser hereby buys from the Government, under the terms and conditions of this contract, all timber, except that reserved to the Government under Sec. 40 of this contract, within the area designated by the Government, comprising the contract area * and situated in the County of ,

State of , and described as follows:

TOWNSHIP	RANGE	SECTION	SUBDIVISION(s)

Sec. 2. Total Purchase Price – Purchaser agrees to pay Government, as the total purchase price for the timber sold hereunder, the sum of

dollars

($); *Provided, however,* that such total purchase price may be adjusted in accordance with Secs. 6, 7, 8, 9, 19, 20, or 41 of this contract.

Sec. 3. Payment

(a) Payments under this contract shall be made as set forth in this section.

(b) Unless total purchase price is paid on or before the date this contract is signed by the Authorized Officer, payments shall be made in installments of not less than dollars

($) as follows: (1) Except as provided in subsection (c) of this section, the first installment shall be paid on or before the date this contract is signed by the Authorized Officer; (2) Except as provided in subsection (c), (d), and (e) of this section, the second installment shall be paid prior to cutting or removal of any timber sold under this contract. Each subsequent installment shall become due and payable without notice whenever the value of timber cut or removed equals the sum of the second and subsequent installments paid by Purchaser. No timber may be cut or removed until such payment has been made. Purchaser shall continue to make such installment payments until the total purchase price has been paid.

(c) Payment of the first installment, required in subsection (b) of this section, may be delayed if Purchaser increases the performance bond as permitted by Sec. 38(b); *Provided, however,* that cash payment for said installment must be made (1) before cutting or removal of the last portion of timber sold having a value equal to the amount of the first installment, or (2) at any time when Government exercises its authority to cancel the rights of Purchaser in accordance with Sec. 10(a), whichever occurs first.

(d) If Purchaser increases its performance bond, as permitted by Sec. 38(c), cutting of timber of a value not in excess of the increase in value of such bond may be permitted prior to payment of the second or subsequent installments; *Provided, however,* that no timber may be skidded or yarded to a loading point or removed from the contract area prior to payment of any installment which, but for the provisions of this subsection, would otherwise be due under the provisions of Sec. 3(b).

(e) If Purchaser provides a payment bond, as permitted by Sec. 38(e), cutting and/or removal of timber of a value not in excess of the penal sum of such bond may be permitted prior to the payment of the second or subsequent installments. Unless a shorter period is agreed to by Purchaser and Government, Government shall bill Purchaser monthly for timber skidded or yarded to a loading point or removed from the contract area. Such billing shall include any amount due for related road maintenance fees. Purchaser shall make payment within fifteen (15) days of the billing date shown on the billing form.

(f) For the purpose of determining (1) when payments are due or (2) the value of timber subject to any special bonding provision, Government shall calculate the value of timber in accordance with the provisions of *Exhibit B,* which is attached hereto and made a part hereof.

(g) Purchaser shall pay the total purchase price not later than the expiration of the time for cutting and removal as set forth in Sec. 4. Purchaser shall make all payments at the office of Authorized Officer in cash, or by money order, bank draft, or check made payable to the Bureau of Land Management.

(h) For any payments or other charge not paid when due, interest shall accrue on the unpaid amount at the rate of six (6) percent per annum, beginning fifteen (15) calendar days after the end of the payment period.

Sec. 4. Time for Cutting and Removal – Except as otherwise provided in this contract, Purchaser may begin cutting and removing timber sold under this contract on the date this contract is signed by the Authorized Officer. Purchaser's right to cut and remove such timber shall expire

( ) months after such date; *Provided, however,* extensions of time may be granted as provided in Sec. 9.

Sec. 5. Definitions

(a) *Authorized Officer* – any employee of the Bureau of Land Management to whom has been delegated the authority to take action in connection with this contract.

(b) *Timber* – standing trees, downed trees, or logs, which are capable of being measured in board feet.

(c) *Loading point* – any landing or other area in which logs are capable of being loaded for transportation out of the contract area; *Provided, however,* that right-of-way timber which has been cut shall not be considered to be at a loading point until such time as logs from any source are actually transported over that portion of the right-of-way.

Sec. 6. Inspection of Timber and Disclaimer of Warranty

(a) Purchaser warrants that this contract is accepted and executed on the basis of its examination and inspection of the timber sold under this contract and its opinion of the value thereof.

(b) Government expressly disclaims any warranty of fitness of the timber for any purpose; all timber sold hereunder is accepted *As Is* without any warranty of merchantability by Government. Any warranty as to the quantity or quality of the timber sold hereunder is expressly disclaimed by Government. Refund to or recovery by Purchaser for failure of title to any timber sold hereunder shall not exceed the value of such timber computed at prices per unit for species involved as set forth in *Exhibit B.*

Sec. 7. Passage of Title and Risk of Loss – Title to timber sold under this contract shall remain in Government and shall not pass to Purchaser until such timber has been paid for and removed from the contract area. Unless cut timber is sold under this contract, risk of loss shall be borne by Purchaser after the timber is cut; *Provided, however,* that if loss results from a fire which was not caused by Purchaser, his contractors, subcontractors, or the employees of any of them, the risk of loss shall be borne by the party holding title. If cut timber is sold under this contract, risk of loss shall be borne by the party holding title. Risk of loss to Government shall

* *General location of contract area is shown on map marked Exhibit A which is attached hereto and made a part hereof*

Form 5450-3 (June 1973)

not exceed the value of such timber computed at the prices per unit for the species involved as set forth in *Exhibit B*. Nothing herein shall be construed to relieve either party from liability for any breach of contract or any wrongful or negligent act. As used in this section, the term *cut timber* refers only to timber which has been felled, bucked, or otherwise severed by direct human activity prior to the date this contract was entered into.

Sec. 8. Sales of Additional Timber — If the Authorized Officer and Purchaser agree that additional timber should be removed and the Authorized Officer determines that the sale will not be detrimental to the interests of Government and is within the provisions of 43 CFR 5402.0–6, the Authorized Officer shall grant written permission to Purchaser to cut and remove such timber. If permission is granted, Purchaser shall pay for such timber at a price determined by the Authorized Officer in accordance with the Bureau of Land Management prescribed procedures. The value and volume of such timber shall be added to *Exhibit B* and the value thereof shall be added to total purchase price in Sec. 2. Payment for such timber shall be made in accordance with Sec. 3(b) or 3(e), except that, if all contract payments required by Sec. 3(b) or 3(e) have been made, payment for such timber shall be made in advance as a condition of granting such permission.

Sec. 9. Extension of Time and Reappraisal — If Purchaser shows that delay in cutting and removal was due to causes beyond his control and without his fault or negligence, the Authorized Officer may grant an extension of time, not to exceed one year, upon written request of Purchaser. Such written request shall be filed with the Authorized Officer prior to the expiration of the time for cutting and removal expressed in Sec. 4. If an extension of time is granted, as provided in this section, timber remaining on contract area shall be reappraised by the Authorized Officer, using Bureau of Land Management prescribed procedures, and the total purchase price adjusted accordingly; *Provided, however,* no adjustment shall be made by reason of timber being enhanced in value by Purchaser, nor shall the reappraised total purchase price be less than the total purchase price in effect during the original time for cutting and removal or the last extension. The Authorized Officer may require that the reappraised total purchase price shall be paid in advance as a condition of granting an extension. Market fluctuations shall not be cause for consideration of contract extensions.

Sec. 10. Violations, Suspension, and Cancellation

(a) If Purchaser violates any provision of this contract, the Authorized Officer may, by written notice, suspend any further operations of Purchaser under this contract, except such operations as may be necessary to remedy the violation. If Purchaser fails to remedy the violation within thirty (30) days after receipt of a suspension notice, the Authorized Officer may, by written notice, cancel the rights of the Purchaser under this contract and take appropriate action to recover all damages suffered by Government by reason of such violation, including application toward payment of such damages of any advance payments and any performance bonds or, where applicable, any payment bonds; *Provided, however,* that if the violation involves nonpayment of amounts due for timber cut and/or removed under a payment bond of a corporate surety, the Authorized Officer must, in addition to the above requirements, allow sixty (60) days after making demand upon surety for any payment due before cancelling the rights of Purchaser.

(b) If Purchaser cuts or removes any timber sold under this contract during any period of suspension, such cutting or removal shall be considered a wilful trespass and render Purchaser liable for damages under applicable law. Any payment made for purchase price of timber cut or removed in trespass shall be deducted to the extent of single damages or the value of timber under this contract, whichever is lesser, from amount due because of trespass.

(c) If Purchaser's operations are suspended because of Purchaser's failure to make an installment payment when due, the Authorized Officer may require Purchaser to pay the entire remaining balance of the purchase price as a condition of terminating the suspension.

(d) If Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber reserved under this contract, they shall fully cooperate, upon request of the Authorized Officer, in the investigation of such acts. If in the opinion of the Authorized Officer, full cooperation is not received or will not be forthcoming, he may suspend that portion of Purchaser's operations necessary to preserve evidence pending investigation or permit safe investigation of such acts.

Sec. 11. Credit Against Purchase Price — If the time specified for cutting and removal of timber has expired or the rights of Purchaser have been cancelled, Purchaser shall be entitled to a credit against any amount which is due and owing Government for timber remaining on the contract area. The Authorized Officer shall determine the credit value of the remaining timber as soon as possible after the date of expiration or cancellation. Credit value of the remaining timber shall be total market value, as established by the Authorized Officer by reappraisal or resale, or total value based upon contract unit prices, whichever is less. There shall be deducted from credit value such amounts as the Authorized Officer determines adequate to cover costs to Government resulting from Purchaser's failure to perform, including but not limited to costs of appraising and administering any resale of timber.

Sec. 12. Responsibility for Damage Suffered, Cost, or Expense Incurred by Government — Purchaser shall be liable for any damage suffered, cost, or expense incurred by Government arising out of any operations under this contract whenever such damage, cost, or expense results from any breach of contract or wrongful or negligent act of Purchaser, his contractors, subcontractors, or the employees of any of them. Purchaser shall pay Government for such damage, cost, or expense after written demand therefor by the Authorized Officer.

Sec. 13. Timber Trespass — If in connection with operations hereunder Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber, other than timber sold under this contract, Purchaser shall be liable for damages under applicable law. Purchaser shall pay Government for such damages after written demand therefor by the Authorized Officer.

Sec. 14. Protection of Utilities and Improvements — Existing telephone, telegraph and transmission lines, fences, ditches, roads, trails, and other improvements shall be protected as far as practicable in all phases of Purchaser's construction or logging operations. All roads and trails, designated by the Authorized Officer as needed for fire protection or other purposes, shall be kept free of logs, slash, and debris. Damage to utilities and improvements shall be promptly paid for or repaired to a condition which, in the opinion of the Authorized Officer, is at least as good as the condition just prior to such damage.

Sec. 15. Fire Prevention and Slash Disposal — Purchaser shall take such measures for prevention and suppression of fire on the contract area and other adjacent Government lands or other Government lands used or traversed by Purchaser in connection with operations as are required by applicable laws and regulations. *However,* when in the opinion of the Authorized Officer, weather and other conditions affecting fire incidence and control make special precautions necessary to protect the contract area and said Government lands, Purchaser shall take such additional or other fire prevention and control measures as may be required by the Authorized Officer. Disposal of slash shall be done in accordance with a plan approved by the Authorized Officer.

Sec. 16. Construction, Use and Maintenance of Roads and Facilities

(a) Subject to the written approval of and regulation by the Authorized Officer, Purchaser may: (1) construct and use any new roads and facilities not otherwise provided for in this contract, and (2) use any existing roads and facilities not otherwise provided for in this contract.

(b) Except as provided in Sec. 12, Purchaser shall perform or pay for repair and maintenance of any road or facility used under the terms of this contract in accordance with the requirements of Sec. 41; *Provided, however,* that Purchaser shall not be responsible for maintenance or repair of wear or damage caused by third parties, or maintenance or repair which exceeds the standards of required maintenance shown in Sec. 41; and *Provided, further,* that Purchaser's responsibility under this provision shall not commence prior to the date on which he first begins operations and shall cease upon completion and written acceptance of all contract requirements other than slash disposal, except for maintenance and repair of damages resulting from Purchaser's slash disposal activities.

Sec. 17. Limitations of Road Use

(a) Purchaser's right under this contract to use existing Government roads described herein, or roads to be constructed, is limited to removal of timber sold under this contract; *Provided, however,* that this provision shall not limit any right to use Government roads or rights-of-way which have been granted to Purchaser pursuant to 43 CFR Group 2800.

(b) For the purpose of protecting roads described herein, Purchaser shall immediately discontinue use of said roads upon receipt of written notice that the Authorized Officer has determined that continued use will cause excessive damage to said roads.

Sec. 18. Acceptance of Road Construction

(a) Whenever Purchaser shall deliver to the Authorized Officer a written statement that the road construction is complete, pursuant to the contract terms, the Authorized Officer shall promptly inspect such road. If the contract road construction requirements have been completed to the satisfaction of the Authorized Officer, Purchaser will be given written notice of acceptance, and, except as provided in Sec. 12, be released from further liability or duty for construction or reconstruction of such road.

(b) Notwithstanding acceptance of any road under this section, Purchaser shall remain liable for maintenance and repair of any such road in accordance with the provisions of Sec. 16.

Sec. 19. Cost Adjustment for Physical Changes — If, prior to acceptance of a road under Sec. 18, a major physical change, caused by a single event, and not due to negligence of Purchaser, his contractors, subcontractors, or the employees

of any of them, results in additional work by Purchaser involving an additional estimated cost of more than (1) $1,000 for sales under one million board feet, (2) $1.00 per thousand board feet for sale of one to three million board feet; or (3) $3,000 for sales over three million board feet, Government shall become responsible for any estimated cost which exceeds the above amounts. Government may elect to meet its share by reducing the purchase price or by payment of such cost to Purchaser or by performing its share of the necessary work. The estimated cost of additional work shall be calculated by the Authorized Officer using Bureau of Land Management prescribed appraisal procedures. Such cost shall include the cumulative estimated costs of repairing damage from slides, washouts, landslips, fire, etc. caused by said event. If necessary, plans and specifications shall be revised to meet the new conditions. Purchaser must obtain advance approval from the Authorized Officer for such additional work in order for Purchaser to be eligible for cost adjustment under this section.

Sec. 20. Design Change — If Purchaser and the Authorized Officer agree on a design change of a substantial nature in any road, road structure, or bridge required to be constructed or improved under the terms of this contract, the total purchase price shall be revised to reflect the estimated increase or decrease in cost resulting from such design change. A design change of substantial nature is one that would result in a cost adjustment of $1,000 or more.

Sec. 21. Rights and Obligations After Time for Removal of Personal Property or Cancellation of the Rights of the Purchaser — If any of Purchaser's obligations remain unperformed after expiration of the time for removal of personal property, as set forth in Sec. 39, or if the rights of Purchaser under this contract have been cancelled by Government, all provisions of this contract for the benefit and protection of Government or third parties shall remain in effect until this contract is terminated in its entirety by Government.

Sec. 22. Protection of Survey Monuments, Witness Corners, Reference Monuments, and Bearing Trees — Purchaser shall protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the contract area. If any monuments, corners, or accessories are destroyed, obliterated, or damaged by such operations, Purchaser shall hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories, at the same location, using surveying procedures in accordance with the *Manual of Instructions for the Survey of the Public Lands of the United States*, and shall record such survey in appropriate county records. The Authorized Officer may prescribe in writing additional requirements for protection of monuments, corners, and bearing trees.

Sec. 23. Purchaser's Representative — At all times when construction or logging operations are in progress, Purchaser shall have a representative readily available in the area of such operations who shall be authorized to receive, in behalf of Purchaser, any notices or instructions from the Authorized Officer in regard to performance under this contract. Purchaser shall take such action as is required by the terms of this contract.

Sec. 24. Simultaneous Use of Contract Area by Others — If the Authorized Officer determines that other use of the contract area will not seriously interfere with the operations of Purchaser, he may issue permits, leases, or contracts for the simultaneous use of the contract area by others.

Sec. 25. Watershed Protection: Water Quality, Erosion Control and Soil Damage

(a) Purchaser shall comply with all applicable State and Federal laws and regulations pertaining to water quality in connection with any operations under this contract.

(b) Purchaser shall take every reasonable precaution not to pollute or obstruct any stream, lake, or reservoir on or near the contract area in connection with any operations under this contract. If Purchaser's operations cause pollution or obstruction of any stream, lake, or reservoir on or near the contract area, Purchaser shall correct the condition to the satisfaction of the Authorized Officer.

(c) Purchaser shall undertake every reasonable measure to minimize erosion and soil damage in connection with any operations under this contract, including but not limited to construction of water bars on yarding and spur roads as designated by the Authorized Officer. Purchaser shall immediately discontinue any construction or timber harvesting operations under this contract, upon receipt of written notice from the Authorized Officer that due to weather or soil moisture conditions, such operations will cause excessive damage to the soil. The Authorized Officer shall notify Purchaser, in writing, when such operations may be resumed.

Sec. 26. Refuse Control and Disposition of Waste Materials

(a) Purchaser shall, to the satisfaction of the Authorized Officer, remove, or otherwise dispose of all garbage, temporary buildings, trash, litter, discarded equipment or parts, waste materials or other refuse resulting from Purchaser's operations. Areas for disposal of waste material shall be subject to approval of the Authorized Officer.

(b) Waste materials, such as garbage, trash, oil, grease, chemicals and similar substances shall be disposed of in a manner that will prevent their entry by drainage, high water, or other means into any river, watercourse, lake, or reservoir in or near Purchaser's operations. Water used to wash down equipment used for petroleum products, industrial chemicals, cement or other toxic materials shall be disposed of in a manner that will prevent their entry into any watercourse or waterway.

Sec. 27. Storage and Handling of Hazardous Materials — All petroleum products, industrial chemicals and similar toxic or volatile materials stored by Purchaser on or near the contract area, in connection with operations under this contract, shall be stored in durable containers and shall be stored in areas, as determined by the Authorized Officer, which are either located so that any accidental spillage will not drain into any watercourses, lakes, or reservoirs or, when such areas are not available, shall be stored in an area surrounded by impermeable containment dikes of sufficient capacity to contain the aggregate capacity of all tanks.

In addition, Purchaser shall comply with all applicable State and Federal laws and regulations concerning the storage, handling, use and disposal of industrial chemicals, pesticides, herbicides, and other hazardous substances.

Sec. 28. Safety and Health — Purchaser shall conduct all operations in connection with this contract in compliance with the applicable provisions of Federal, State, and local safety, health and sanitation laws, codes, and regulations and shall make it possible for the Authorized Officer to inspect such operations.

Sec. 29. Equal Opportunity — During the performance of this contract, Purchaser agrees as follows:

(a) Purchaser will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. Purchaser will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Purchaser agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this section.

(b) Purchaser will, in all solicitations or advertisements for employees placed by or on behalf of Purchaser, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(c) Purchaser will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of Purchaser's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) Purchaser will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) Purchaser will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of Purchaser's noncompliance with this section, contract may be cancelled, terminated or suspended in whole or in part and Purchaser may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) Purchaser will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor, or vendor. Purchaser will take such action with respect to any subcontract, or purchase order, as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however,* that in the event the Purchaser becomes involved in, or is threatened with, litigation with a subcontractor, or vendor as a result of such direction by the contracting agency, Purchaser may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 30. Records and Reports — Upon request of the Authorized Officer, Purchaser shall furnish the following records and reports: (1) volume or quantity of timber cut and removed from the contract area; (2) road costs including road use fees paid in connection with removing timber from the contract area; and (3) prices received for lumber or other wood products.

Sec. 31. Unsatisfactory Bond — Whenever any performance or payment bond furnished under this contract becomes unsatisfactory to the Authorized Officer, he may require a new bond which is satisfactory to him.

Sec. 32. Assignments

(a) Purchaser may not assign this contract or any interest therein without written approval of the Authorized Officer. An assignment shall contain all the terms and conditions agreed upon by the parties thereto.

(b) The Authorized Officer will not approve any assignment involving contract performance unless assignee: (1) is authorized to transact business in the State indicated in Sec. 1; (2) submits such information as is necessary to assure the Authorized Officer of his ability to fulfill the contract; and (3) furnishes a performance bond as required by Sec. 38 or obtains a commitment from the previous surety to be bound by the assignment when approved. Upon approval of an assignment by the Authorized Officer, the assignee shall be entitled to all the rights and subject to all the obligations of this contract and the assignor shall be released from any further liability under this contract.

Sec. 33. Contingent Fees — Purchaser warrants that no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee excepting bona fide employees or bona fide established commercial agencies maintained by Purchaser for the purpose of securing business. For breach or violation of this warranty, Government shall have the right to cancel this contract without liability or, in its discretion, to require Purchaser to pay, in addition to the contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

Sec. 34. Successors in Interest — Every obligation hereunder shall extend to and be binding upon the successors in interest of the parties hereto and every benefit hereunder shall inure to such successors.

Sec. 35. Exercise of Rights or Duties of the Authorized Officer — The rights or duties of the Authorized Officer may be exercised by the Authorized Officer or his designated representative.

Sec. 36. Officials not to Benefit — No Member of, or Delegate to Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4, shall be admitted to any share or part in this contract or derive any benefit that may arise therefrom; and the provisions of Section 3741 of the Revised Statutes of the United States, as amended (41 U.S.C. Sec. 22), and Sections 431, 432, and 433, Title 18, U.S.C., relating to contracts, enter into and form a part of this contract so far as the same may be applicable.

Sec. 37. Appeal — An appeal may be taken from any decision of any officer of the Bureau of Land Management to the Board of Land Appeals pursuant to the Rules of Practice (43 CFR Part 4 Subpart E).

Sec. 38. Bond

(a) A performance bond shall be filed by Purchaser on or before the date this contract is signed by the Authorized Officer in the amount of

dollars ($).

(b) If Purchaser elects to increase the amount of the performance bond required above by an amount equal to the first installment, in order to secure the delayed payment of said installment, as provided in Sec. 3(c), increased bond shall be on a form approved by the Director of the Bureau of Land Management which upon completion must be approved, in writing, by the Authorized Officer. If a corporate surety bond is used, the bond shall provide that the Surety will pay to Government the amount of the increase within sixty (60) days after demand by Government whenever the Principal shall fail to make payment as required in Sec. 3(c).

(c) If Purchaser elects to cut timber before payment of the second or subsequent installments, Purchaser shall increase the amount of the required performance bond by an amount equal to one or more installments, as set forth in Sec. 3(b). The adjusted bond must be approved, in writing, by the Authorized Officer prior to cutting any timber under the adjusted bond. The increased amount of bond shall be used to assure payment for such timber. Timber cut pursuant to this subsection may be paid for in installments. Upon payments, the increased amount of bond may be applied to other timber sold under this contract to permit its cutting in advance of payment.

(d) As contract provisions are completed to the satisfaction of the Authorized Officer, he may, in his discretion, reduce amount of performance bond required; *Provided, however,* the performance bond may not be reduced below the amount of

dollars ($)

until total purchase price has been paid. The performance bond shall be forfeited to the amount of damages, determined by the Authorized Officer if all contract provisions are not faithfully and fully performed by Purchaser. If the amount of damages exceeds the amount of the bond, Purchaser hereby agrees to pay the excess. Upon satisfactory performance of all provisions of this contract, the bond shall be cancelled or, if cash or negotiable securities are furnished in lieu of a performance bond, such cash or negotiable securities shall be returned to Purchaser. In event of litigation, any determination by the Authorized Officer as to the amount of damages will be subject to review by a court of competent jurisdiction.

(e) If Purchaser elects to: (1) cut and remove timber or (2) remove timber already cut which has been secured by an increased performance bond as provided in Sec. 38(c), before payment of the second or subsequent installments, Purchaser shall obtain a payment bond in an amount equal to one or more installments as set forth in Sec. 3(b). The payment bond must be approved, in writing, by the Authorized Officer prior to cutting or removing any timber under the bond. The amount of the bond shall be used to assure payment for such timber, *Provided, however,* that such bond shall be considered as payment under Sec. 7, for the purpose of passing title and risk of loss to timber sold. Timber cut pursuant to this subsection shall be paid for as provided in Sec. 3(e). Upon payment, the amount of the bond may be applied to other timber to permit its cutting and/or removal in advance of payment. If a bond of a corporate surety is used, it shall provide that, if Purchaser fails to make payment as required by Sec. 3(e), the surety will make such payment including interest as specified in Sec. 3(h), to Government within sixty (60) days after demand by Government.

Sec. 39. Time for Removal of Personal Property — Purchaser shall have the right within ( ) months after expiration of time for cutting and removal to remove his equipment, improvements, or other personal property from Government lands or rights-of-way; *Provided, however,* that any improvements such as road surfacing, culverts and bridges which have become a permanent part of a Government road, shall not be removed. The Authorized Officer may, in his discretion, grant an extension of time, not to exceed three (3) months for removal of personal property. Any equipment, improvements, or other personal property remaining on Government lands and rights-of-way at the end of the period for removal, or any extension, shall become the property of Government.

Sec. 40. Timber Reserved from Cutting — The following timber on the contract area is hereby reserved from cutting and removal under the terms of this contract and is retained as the property of Government.

Sec. 41. Special Provisions — Purchaser shall comply with the special provisions which are attached hereto and made a part hereof unless otherwise authorized, in writing, by the Authorized Officer.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day first above written.

If Individual or Partnership, sign here:	If Corporation, sign here:
(Name of Firm)	(Name of Corporation)
(Name)	(Name)
(Address)	(Title)
(Name)	UNITED STATES OF AMERICA
(Address)	By (Name)
(Name)	(Title)
(Address)	(Date)

(If Purchaser is a corporation, the following certificate must be executed by the Secretary or Assistant Secretary of the Corporation)

I, certify that I am the Secretary of the corporation named as Purchaser herein; that , who signed the contract was then of said corporation, that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

[CORPORATE SEAL]

☆ GPO 783-514

APPENDIX C

VISUAL RESOURCE MANAGEMENT CLASSES

VRM classes result from the interaction of scenery quality, visual zones, and sensitivity level. Specific visual resource management objectives for Classes I through V are as follows.

Class I

This class provides for natural ecological changes only. It is applied to primitive areas, some natural areas, and other similar situations where management activities are to be restricted. The wild area of the Rogue River and the Brewer Spruce Natural Area are rated as Class I.

Class II

This class requires management activities to be designed and located to blend into the natural landscape so they are not apparent to the casual visitor.

Class III

This class provides that management activities may be evident to the casual visitor; however, the activity should remain subordinate to the visual strength and natural character of the landscape.

A management activity may repeat the dominant qualities common in the landscape and may visually change the essential character of existing

dominance factors in the landscape. However, these changes must be relatively small in scale and generally subordinate to the visual strength of the natural landscape.

Class IV

This class provides that management activities may be visually apparent to the casual observer and may also become dominant in the landscape.

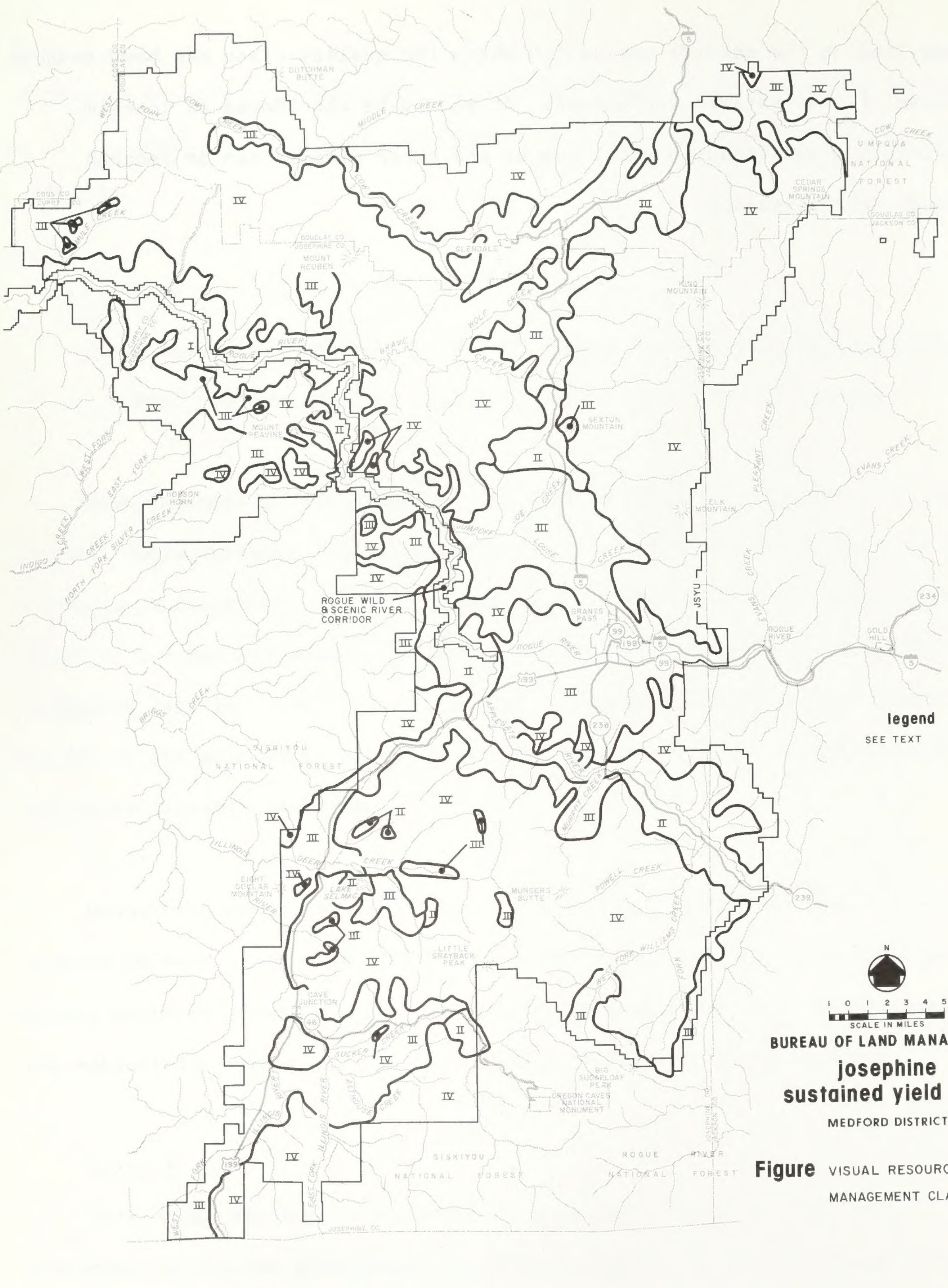
Establishment of strong visual linkages between the management activity and the characteristic landscape is critical to reduce visible impacts. When viewed as a foreground or middleground, the management activity may be totally dominant and may not appear to completely borrow from naturally established dominance factors. However, when viewed as background, the visual characteristics of the management activity must be those of natural occurrences within the characteristic landscape.

Management activities which are visually apparent may be located in critically sensitive areas such as prominent features, long view-duration areas, enframed views, and other critical focus areas if such modifications are subject to sensitive analysis by visual design arts disciplines.

Class V

This class applies to areas where the natural character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas

identified in the scenery evaluation where the quality class has been reduced because of unacceptable intrusions. It should be considered an interim short-term classification until one of the other classes can be reached through rehabilitation.



legend

SEE TEXT

BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT

Figure VISUAL RESOURCE MANAGEMENT CLASSES

APPENDIX D

Soils of the Josephine SYU -- Their Properties and Interpretations

Soils of the Josephine Master Unit and Their Properties and Interpretations

Map Sym.	Mean Elev. (feet)	Precip. Zone (in.)	Classification Subgroup- -Family- -Series	Position on Landform	Parent Material	Texture Surface Soil / Sub-Soil	Dominant Slope Range %	Aspect	Coarse Fragments Kind & %	Profile Depth (in.)	Permeability	Compaction Hazard	Drainage	Avail. H_2O Holding capacity (in.)	Major Limitation
						Soil Characteristics						**Soil Qualities and Interrelations**			
1			miscellaneous land type	flood plains of old Stream Terraces	holocene alluvium	-	-	-	-	-	-	-	-	-	—
R			miscellaneous land type	rock outcrop	-	-	-	-	-	-	-	-	-	-	----
370	1500-4000	35-70	Dystric Xerochrepts loamy-skeletal, mixed, mesic- -unnamed	mt.'ous slopes	collu-vium	GL / L	10-85+	N. if below 2500 ft	gravel 35-75	40+	M	M	well drained	3-6	-steep
371	1500-4000	35-70	Typic Xerochrepts- loamy-skeletal over fragmental, mixed, mesic- -unnamed	mt.'ous slopes	collu-vium	VGL / L	35-85+	N. if below 2500 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-droughty -steep
372	1500-4000	35-80	Lithic Xerochrepts- Loamy-skeletal, mixed, mesic- -unnamed	mt.'ous slopes	collu-vium	GL / VGCL	35-85+	N. if below 2500 ft	gravel 35-70	0-12	M	slight	well drn'd	-3	-droughty -steep -shallow
(380)	1500-4000	35-80	Typic Haploxerults- -fine, mixed, mesic- - Pollard	mt.'ous slopes	collu-vium	CL / C	35-60+	N. if below 2000 ft	gravel 5-35	40+	MS	severe	well drn'd	6-9	-compaction -steep -sediment
381	1500-4000	35-80	Typic Haploxerults -clayey skeletal, mixed, mesic- -unnamed	mt.'ous slopes	collu-vium	GCL / VGC	35-85	N. if below 2000 ft	gravel 35-75	20-40	MS	M severe	well dr'nd	3-6	-compaction -steep -sediment
382	1500-4000	35-80	Typic Haploxerults- -clayey-skeletal, mixed, mesic- -unnamed	mt.'ous slopes	collu-vium	GCL / VGCL	10-65	N. if below 2000 ft	gravel 35-75	40+	MS	M severe	well drn'd	3-6	-compaction -slumpage -erosion

(Source: DeMoulin, et. al., 1975)

						Soil Characteristics					Soil Qualities and Interrelations				
Map Sym.	Mean Elev. (feet)	Precip. Zone (in.)	Classification Subgroup- -Family- -Series	Position on Landform	Parent Material	Texture Surface Soil / Sub-Soil	Dominant Slope Range %	Aspect	Coarse Fragments Kind & %	Profile Depth (in.)	Permeaability	Compaction Hazard	Drainage	Avail. H^2O Holding capacity (in.)	Major Limitation
701	1200-4000	20-35	Lithic Xerochrepts- -loamy skeletal, mixed, mesic- -unnamed	Mt.'ous slopes	colluvium	VGL / VGL	35-85	South	gravel 35-70	12-20	M-M rapid	slight	somewhat excessively drn'd	3	-droughty -erosion
712	1500-4000	30-50	Ultic Haploxerolfs- -fine, mixed, mesic- -Jumpoff	mt.'ous benched sideslopes	colluvium	GCL / C	10-35	varies	gravel 10-35	40+	S-VS	severe	M well drn'd	3-6	-compaction -slumpage -erosion
(718)	1000-4000	20-35	Typic Xerocurepts- -loamy-skeletal, mixed, mesic- -Beekmon	mt.'ous slopes	colluvium	VGL / VGL	35-85	S. if above 2500 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-droughty -erosion
(719)	1500-3000	20-35	Typic Hapoxeralts- -fine, mixed, mesic- -Manzanita	alluvial fans & upland slopes	colluvium	CL / C		S. if above 2500 ft	gravel 5-35	40+	MS	severe	well drn'd	6-6-9	-compaction -erosion
721	1200-4000	30-50	Typic Xerochrept- -coarse-loamy, mixed, mesic- -Siskiyou	Steep hills & Mtns.	Granitic colluvium	sandy loam over G sandy loam	35-85	varies	gravel 5-35	20-40	M rapid	slight	somewhat excessively drn'd.	3	-erosion -slumping
722	1200-3000	30-50	Ultic Haploxeralfs- -fine-loamy, mixed, mesic- -Holland	footslopes & alluvial fans	granitic colluvium	L / CL	3-35	varies	gravel 3-25	40+	MS	slight -Mod.	well	6-9	-erosion -slumping
770	1000-5000	25-60	Lithic Xerochrepts- -clayey skeletal, serpnetinitic, mesic- -Pearsoll	mt.'ous slopes	serpentinitic colluvium	CL / cobbly clay	10-85	varies	gravel & cobbles 35-75	12-20	slow	M-severe	well drn'd	3	-fertility -erosion -sediment -droughty

(Source: DeMoulin, et. al., 1975)

						Soil Characteristics					Soil Qualities and Interrelations				
Map Sym.	Mean Elev. (feet)	Precip. Zone (in.)	Classification Subgroup- -Family- -Series	Position on Landform	Material	Texture Surface Soil / Sub-Soil	Dominant Slope Range %	Aspect	Coarse Fragments Kind & %	Profile Depth (in.)	Permeability	Compaction Hazard	Drainage	Avail. H_2O Holding capacity (in.)	Major Limitation
781	1000-4000	20-35	Typic Xerochrepts- -fine-loamy, mixed, mesic- -Colestine	mt.'our slopes	colluvium	L / CL	35-60	S. if above 2500 ft	gravel 10-35	20-40	M	slight -mod.	well drn'd	3-6	-erosion -slumpage -regeneration
824	3500-6000	40-80	Dystric Xerochrepts- -loamy-skeletal over fragmental, mixed, frigid- -unnamed	mt.'ous slopes	colluvium	VGL / VGL	5-85	N. if below 4000 ft	gravel 35-75	20-40	M	slight	well drn'd	3-6	-erosion -slumpage
825	3500-6000	40-80	Dystric Lithic Xerochrepts- -loamy-skeletal over fragmental, mixed, frigid- -unnamed	ridges & side-slopes	volcanic colluvium	GL / C	5-80	N. if below 4000 ft	gravel 5-35	12-20	M-M rapid	slight	well drn'd	3	-shallow -erosion -regeneration

Key: C = clay
G = gravelly
L = loam
V = very

N = north
S = south

M = moderate
S = slow

drn'd = drained

(Source: DeMoulin, et. al., 1975)

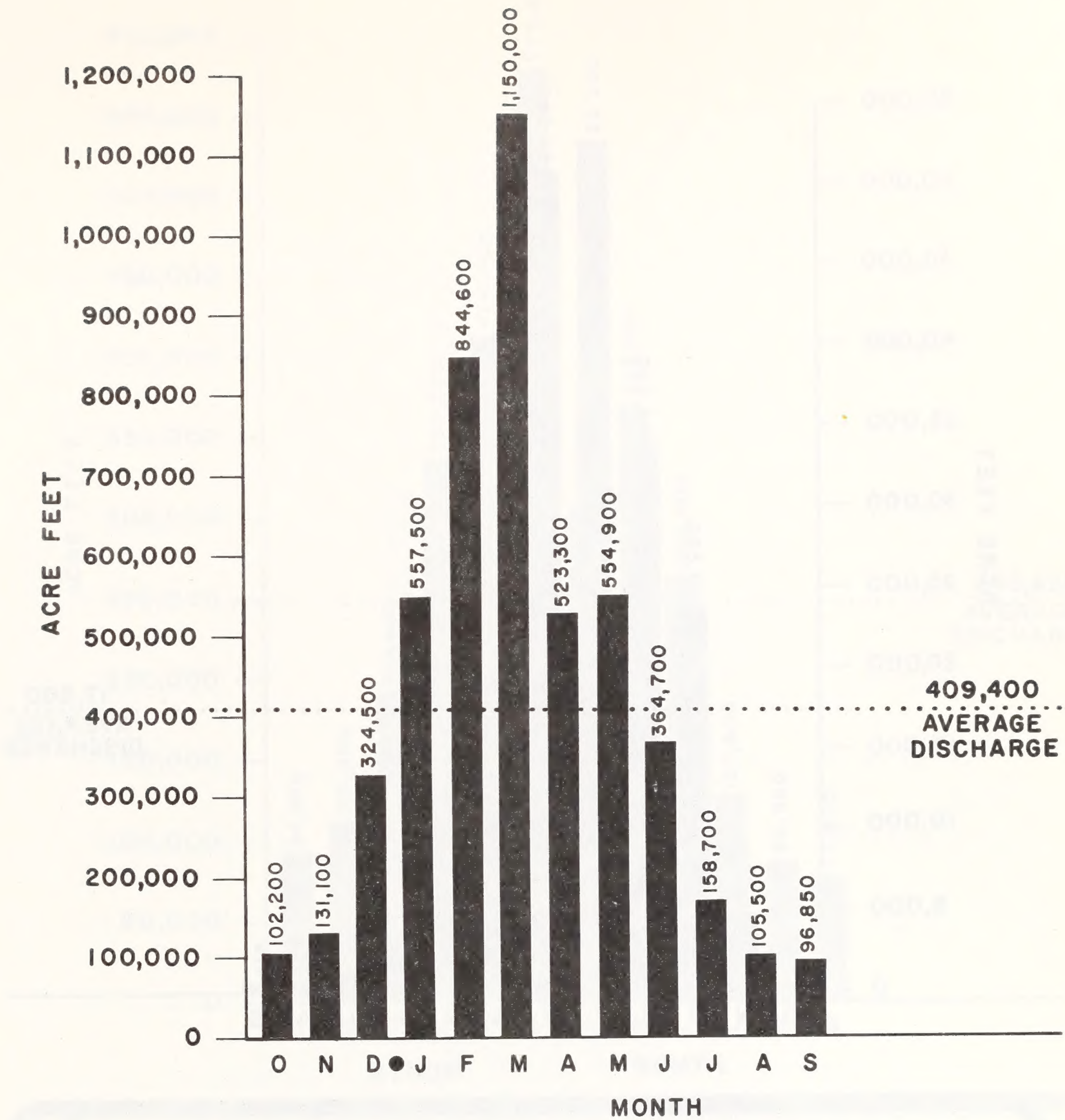
Soil Mapping Units and Acreages for
the Josephine SYU

Map Symbol	Acres		
	BLM	Private	Total
1	4880	20160	25040
R	4620	500	5120
370-382-371/XW	5090	1720	6880
370-382-371/XWN	6850	1080	7930
370-382-371/XY	15270	8520	23790
370-382-371/XYn	29030	11780	40810
371-372-370/XY	55550	29540	85090
371-372-370/XYn	49520	25810	75330
372-371/Y	17860	4630	22490
372-371/Yn	31870	8250	40120
372-R/Y	19410	3900	23310
372-RYn	1460	1190	2650
380/W	5150	5280	10430
380-382/WX	10170	10260	20430
380-382/WXn	10720	7760	18480
381-380/X	12340	8190	20530
381-380/Xn	4240	2800	7040
381-380/XY	9830	6640	6470
381-380/XYn	4770	4590	9360
701-R/Y	2570	1140	3710
712/WX	4210	4400	8610
712/WXn	660	1640	2300
712-718/X	2340	1260	3600
712-718/Xn	1120	970	2090
718-710/XY	8130	2770	10900
718-801XYn	1330	1790	3120
718-701/Yn	2130	2010	4140
718-719/WX	2740	2270	5010
718-781/XY	11170	8840	20010
718-781/XYn	10430	4240	14670
719/VW	1210	4200	5410
719/W	1890	4480	6370
719/Wn	670	1320	1990
719/WX	2300	4230	6530
719/WXn	2140	0	2140
719-781/WX	2380	1310	3690
719-781/WXn	280	620	900
721/X	4050	2500	6550
721/Xn	1800	940	2740
721/XY	2660	640	3300
721/XYn	3900	3350	7250
721/Y	640	0	640
721/Yn	1940	0	1940
722/V	810	1870	2680
722/VW	2850	850	3700
722/W	500	530	1030
722/Wn	10	130	140
770-R/XY	26110	10760	36870
781-719/WX	1050	640	1690
781-719/WXn	420	110	530
781-719/XY	2990	3020	6010
781-719/XYn	2880	3860	6740
824-825/XY	2380	170	2550
824-825/XYn	9460	1970	11430
	425480	243940	669420

(Source: DeMoulin, et al., 1975)

APPENDIX E

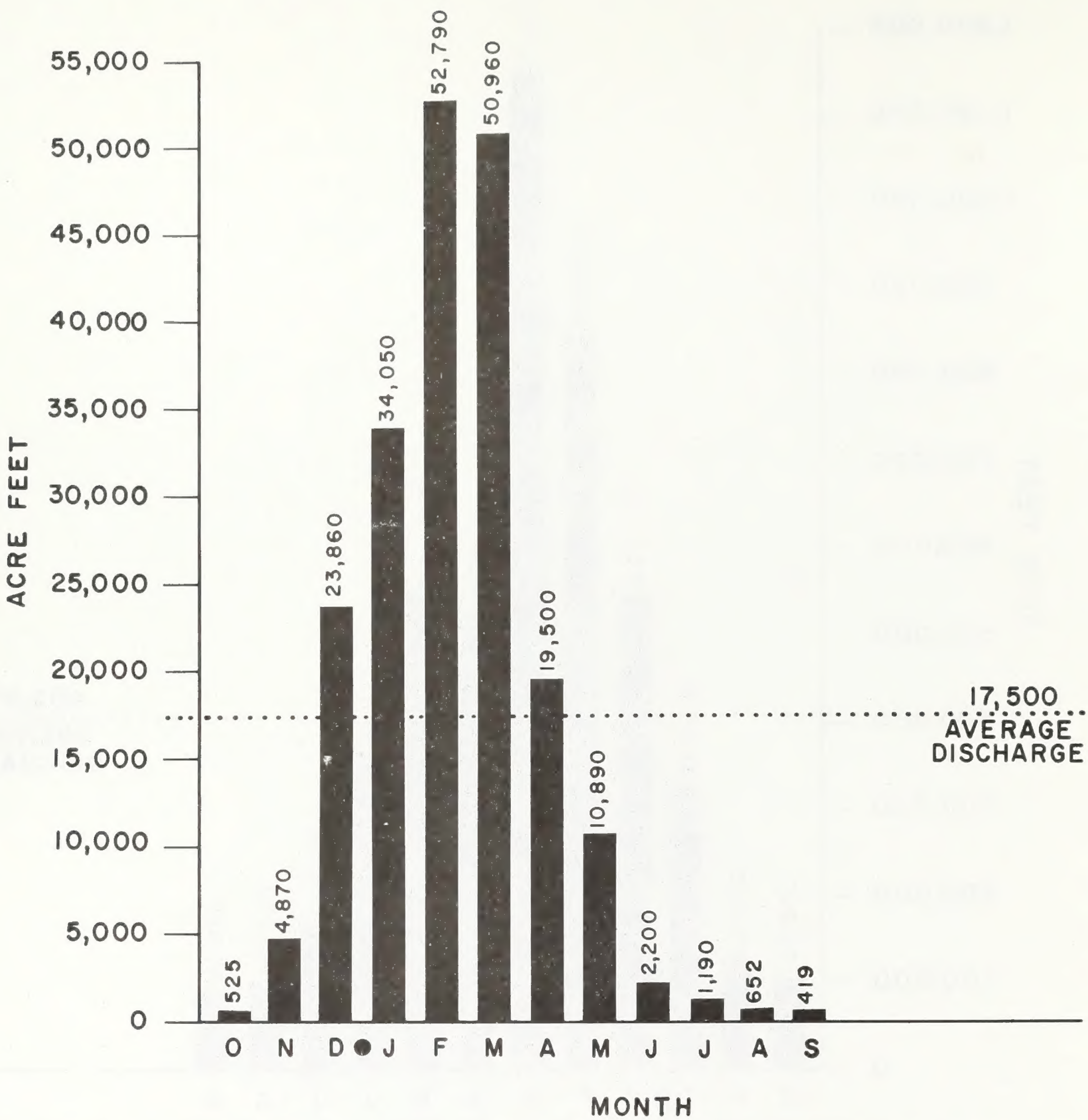
Water Resources: Mean Monthly Discharges and Annual Yields, Major Streams



E-1 MEAN MONTHLY DISCHARGE FOR ROGUE RIVER NEAR AGNESS, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

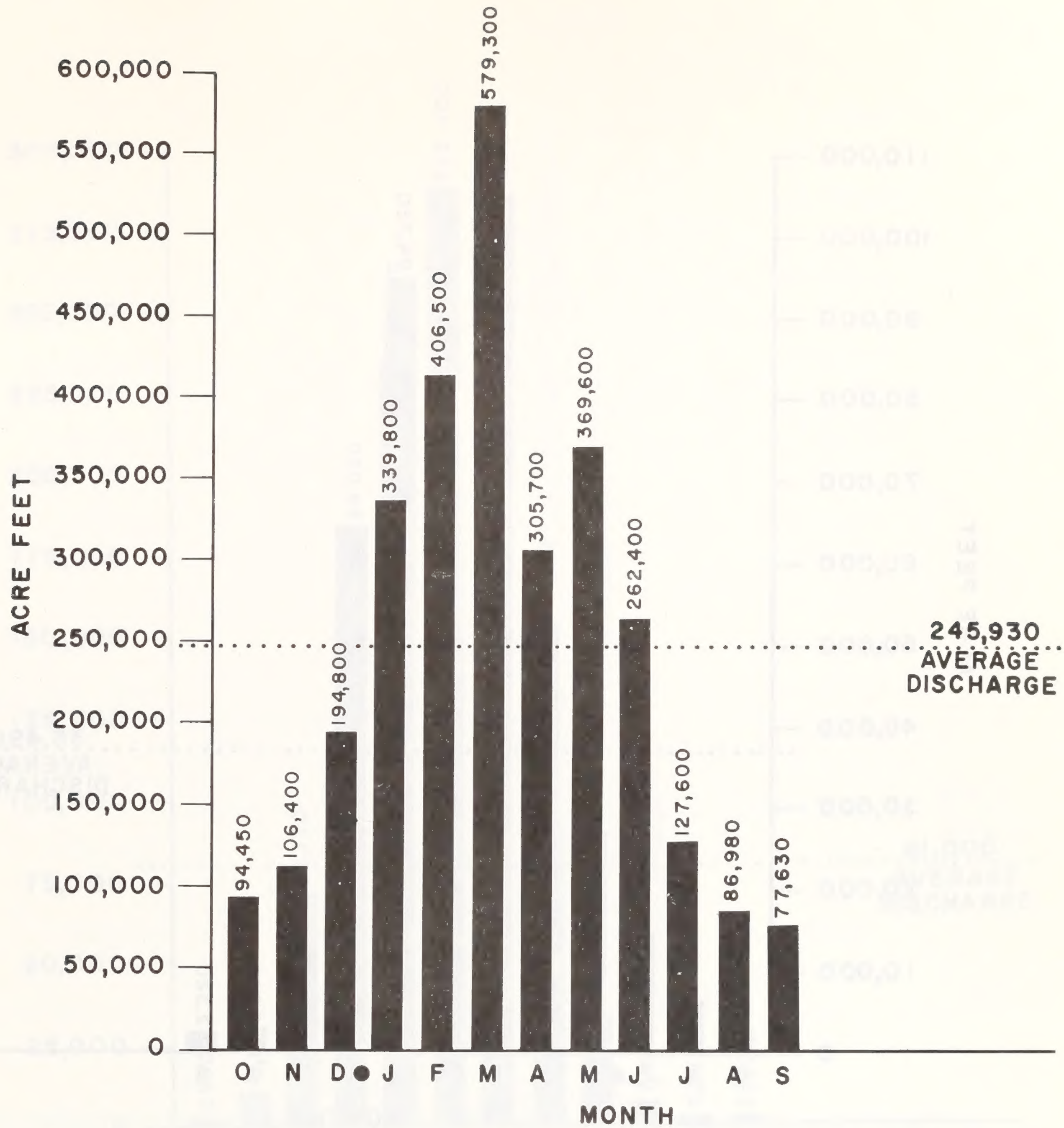
RECORDS:
- •Average Annual Discharge ——— 4,880,000 Ac. Ft. (15 years record)
- •Average Discharge, WY 1975 ——— 4,918,000 Ac. Ft.
- •Maximum Daily Discharge ——— 290,000 Ft.^{3}/Sec. Dec. 22, 1964
- •Minimum Daily Discharge ——— 608 Ft.^{3}/Sec. Jul. 9 & 10, 1968
- •Average Daily Discharge ——— 6,792 Ft.^{3}/Sec. (15 years record)



E-2 MEAN MONTHLY DISCHARGE FOR COW CREEK NEAR GLENDALE, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

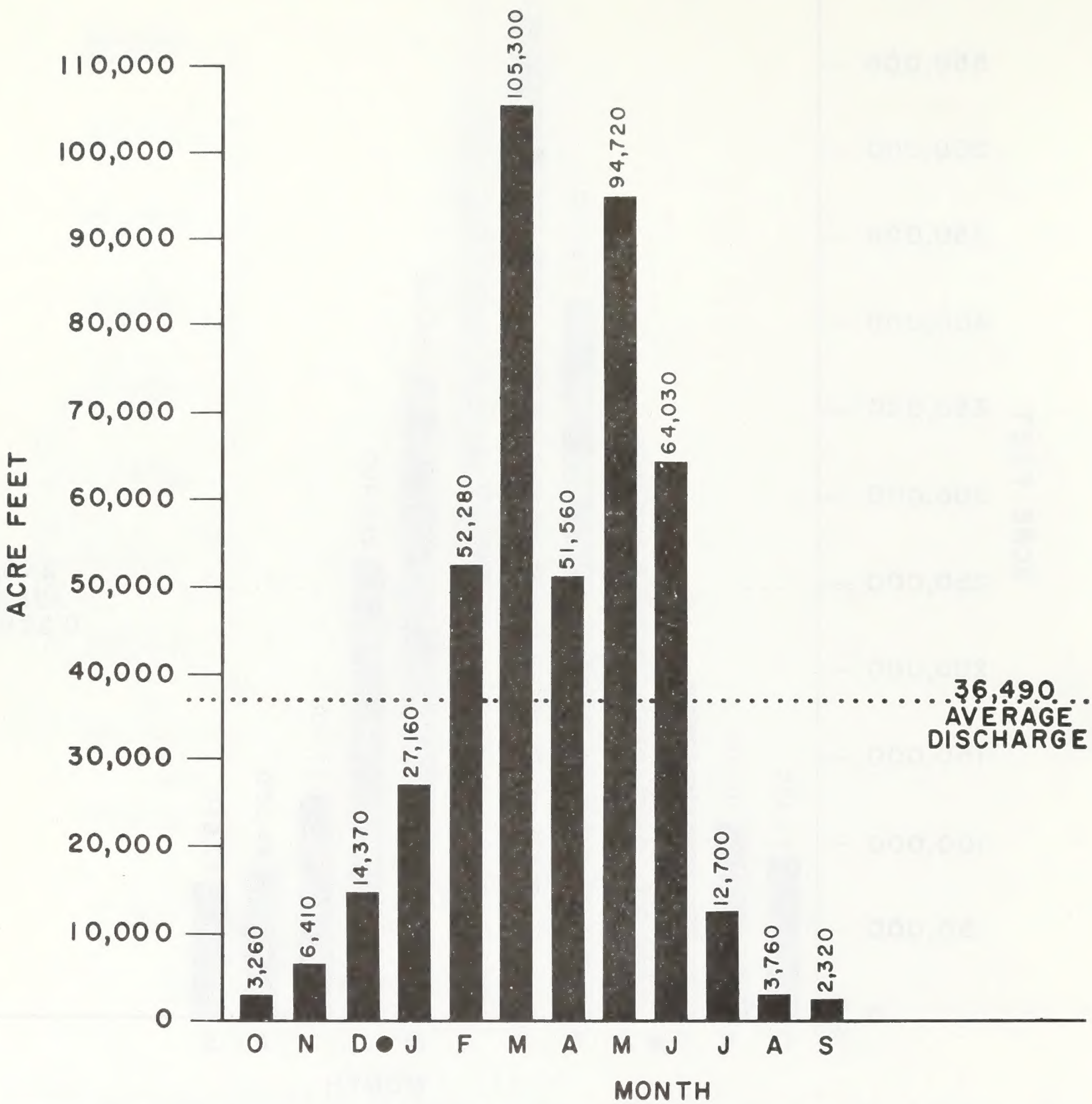
RECORDS:
- Average Annual Discharge ———— 210,800 Ac. Ft.
  (20 years record)
- Average Discharge, WY 1975 ———— 201,900 Ac. Ft.
- Maximum Daily Discharge ———— 15,700 $Ft.^3/Sec.$
  Dec. 22, 1964
- Minimum Daily Discharge ———— 5.9 $Ft.^3/Sec.$
  Sep. 23 & 24, 1975
- Average Daily Discharge ———— 291 $Ft.^3/Sec.$
  (20 years record)



E-3 MEAN MONTHLY DISCHARGE FOR ROGUE RIVER AT GRANTS PASS, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

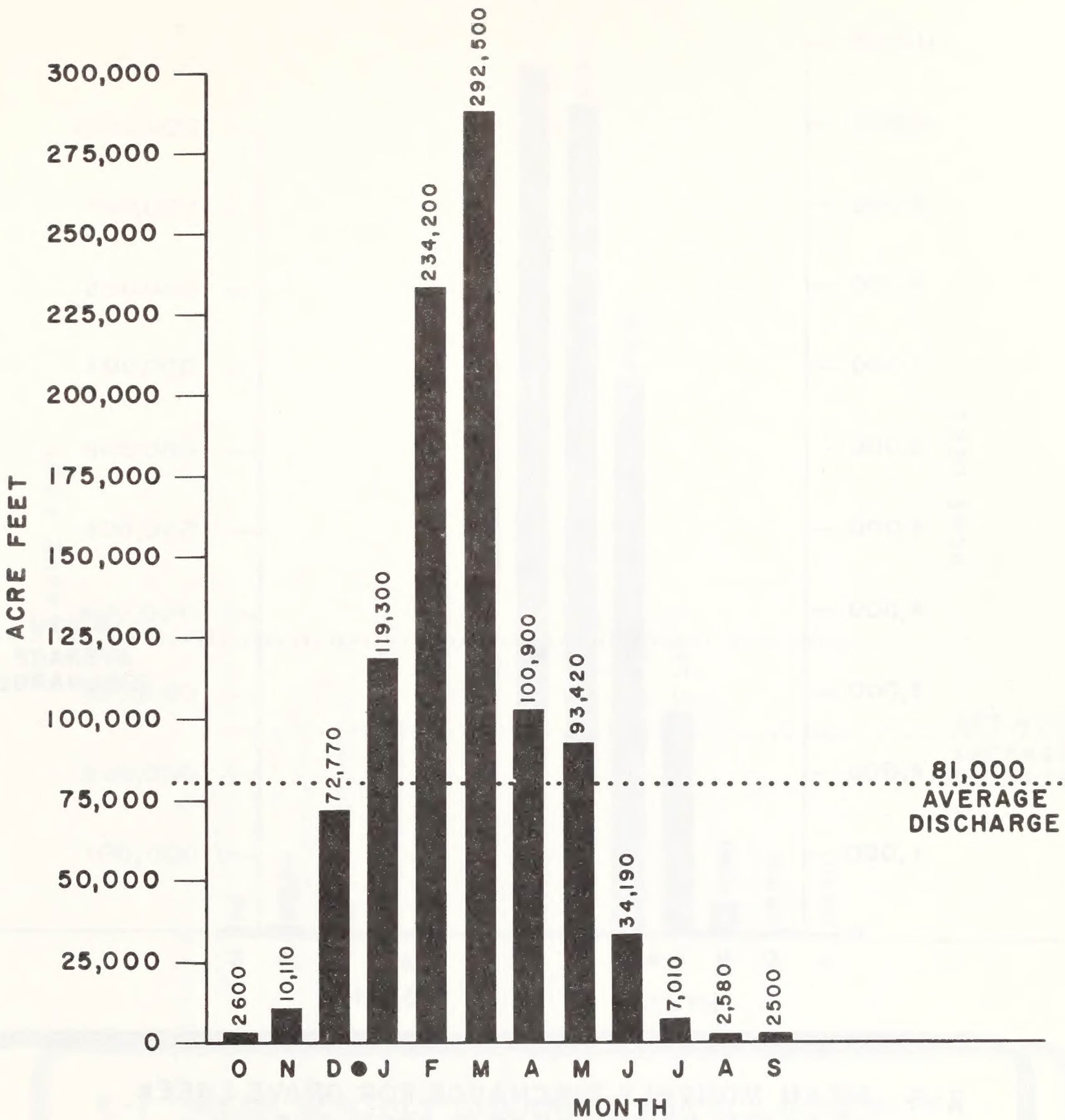
RECORDS:
- Average Annual Discharge —— 2,592,000 Ac. Ft. (37 years record)
- Average Discharge, WY 1975 —— 2,951,000 Ac. Ft.
- Maximum Daily Discharge —— 152,000 $Ft.^3/Sec.$ Dec. 23, 1964
- Minimum Daily Discharge —— 195 $Ft.^3/Sec.$ Jan. 30, 1961
- Average Daily Discharge —— 35,780 $Ft.^3/Sec.$ (37 years record)



E-4 MEAN MONTHLY DISCHARGE FOR APPLEGATE RIVER NEAR APPLEGATE, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

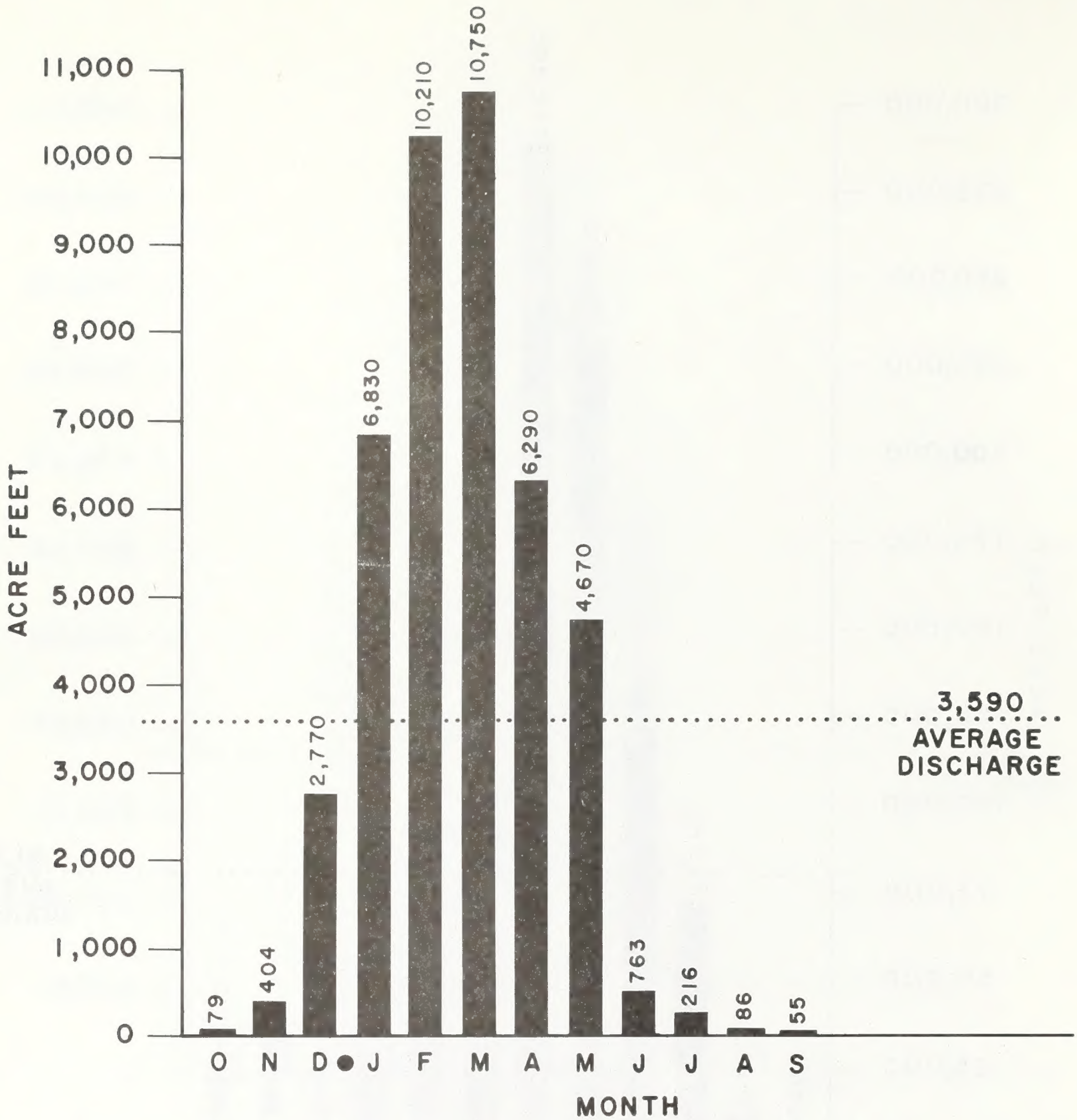
RECORDS:
- Average Annual Discharge (37 years record) — 413,700 Ac. Ft.
- Average Discharge, WY 1975 — 437,900 Ac. Ft.
- Maximum Daily Discharge Dec. 22, 1964 — 45,700 $Ft.^3$/Sec.
- Minimum Daily Discharge Sep. 15, 1960 — 7 $Ft.^3$/Sec.
- Average Daily Discharge (37 years record) — 571 $Ft.^3$/Sec.



E-5 MEAN MONTHLY DISCHARGE FOR ILLINOIS RIVER NEAR KERBY, OREGON ● WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

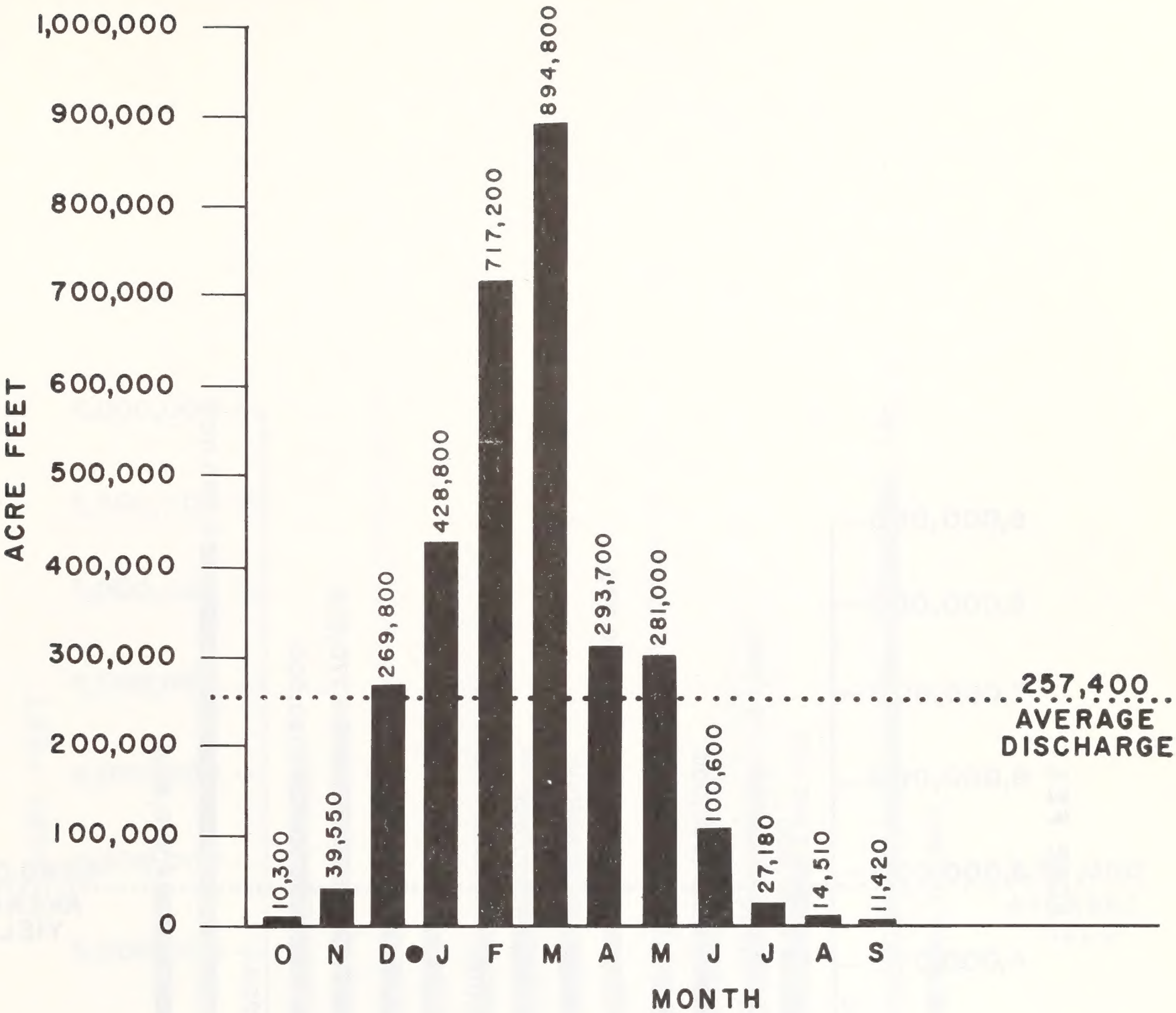
RECORDS:
- Average Annual Discharge —— 1,007,000 Ac. Ft.
  (14 years record)
- Average Discharge, WY 1975 —— 972,200 Ac. Ft.
- Maximum Daily Discharge —— 30,000 Ft.^{3}/Sec.
  Dec. 22, 1964
- Minimum Daily Discharge —— 18 Ft.^{3}/Sec.
  Aug. 23, 1973
- Average Daily Discharge —— 1,390 Ft.^{3}/Sec.
  (14 years record)



E-6 MEAN MONTHLY DISCHARGE FOR GRAVE CREEK AT PEASE BRIDGE NEAR PLACER, OREGON ● WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

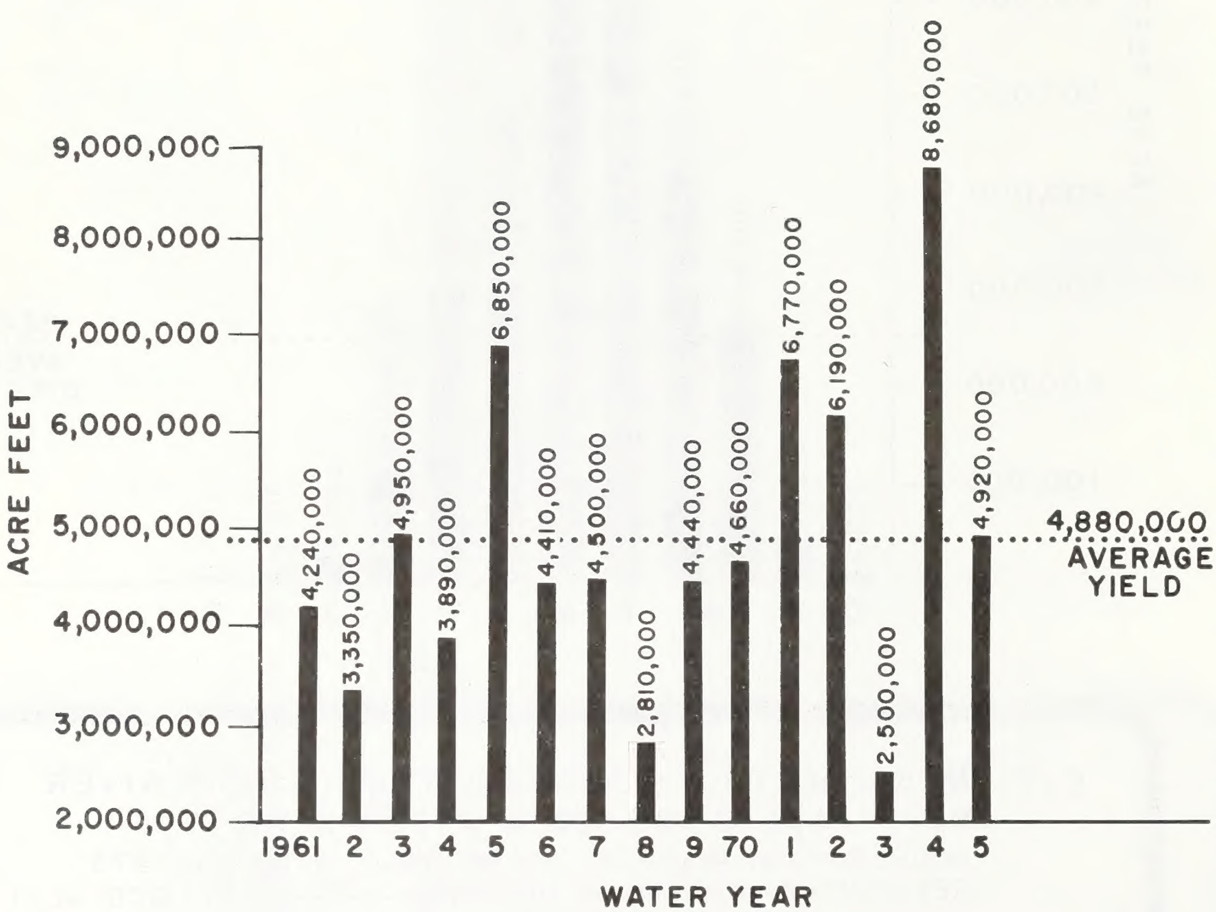
RECORDS:
- ● Average Annual Discharge —————— 44,630 Ac. Ft. (30 years record)
- ● Average Discharge, WY 1975 —————— 43,120 Ac. Ft.
- ● Maximum Daily Discharge —————— 6,240 Ft.³/Sec. Dec. 22, 1964
- ● Minimum Daily Discharge —————— 0.12 Ft.³/Sec. Jul. 15, 1970
- ● Average Daily Discharge —————— 61.6 Ft.³/Sec. (30 years record)



E-7 MEAN MONTHLY DISCHARGE FOR ILLINOIS RIVER NEAR AGNESS, OREGON ● WATER YEAR 1975

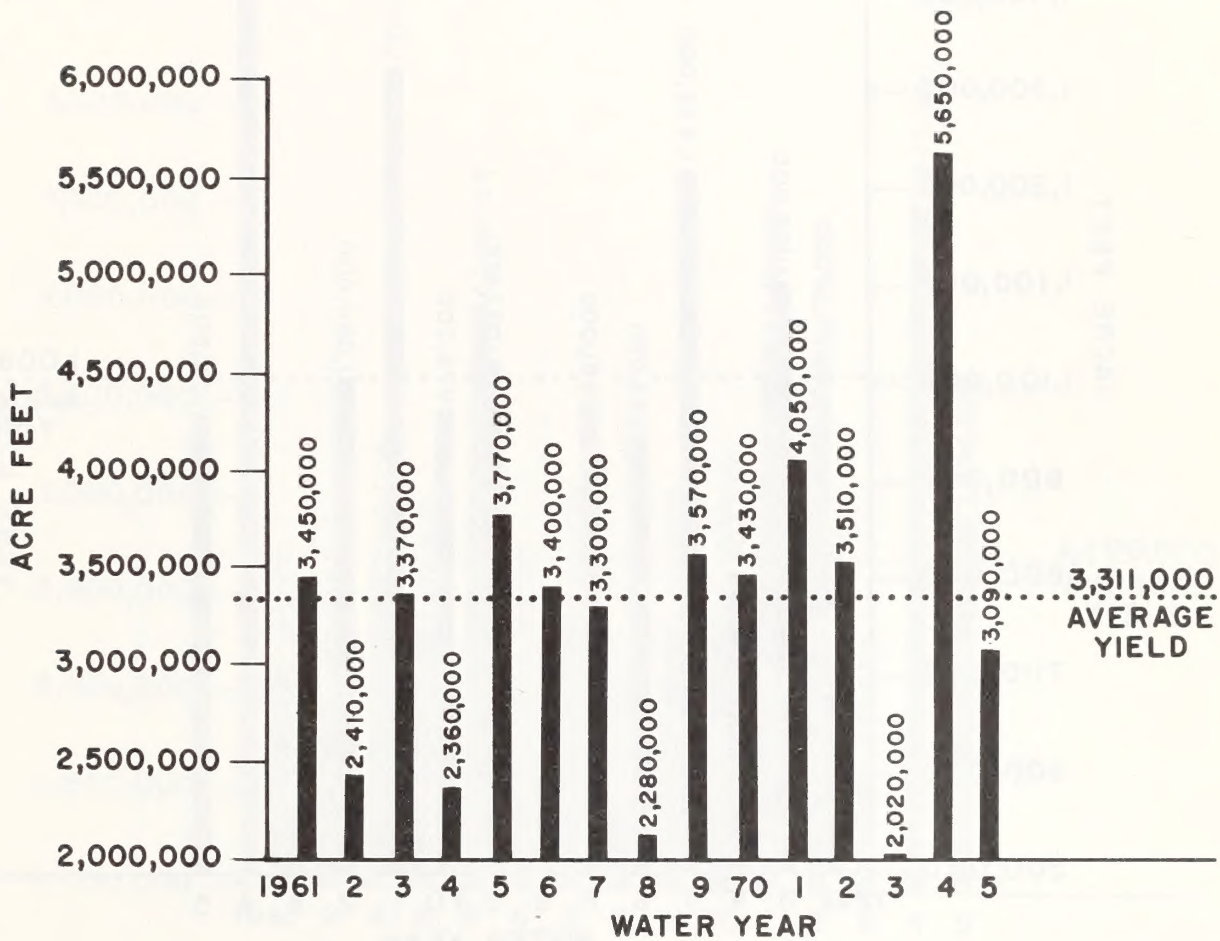
SOURCE: Water Resources Data for Oregon, Water Year 1975

RECORDS:
- ●Average Annual Discharge ———— 3,311,000 Ac. Ft. (15 years record)
- ●Average Discharge, WY 1975 ———— 3,089,000 Ac. Ft.
- ●Maximum Daily Discharge ———— 225,000 Ft.^{3}/Sec. Dec. 22, 1964
- ●Minimum Daily Discharge ———— 130 Ft.^{3}/Sec. Sep. 10, 11, & 17, 1972 and Sep. 16 & 17, 1973
- ●Average Daily Discharge ———— 4,570 Ft.^{3}/Sec. (15 years record)



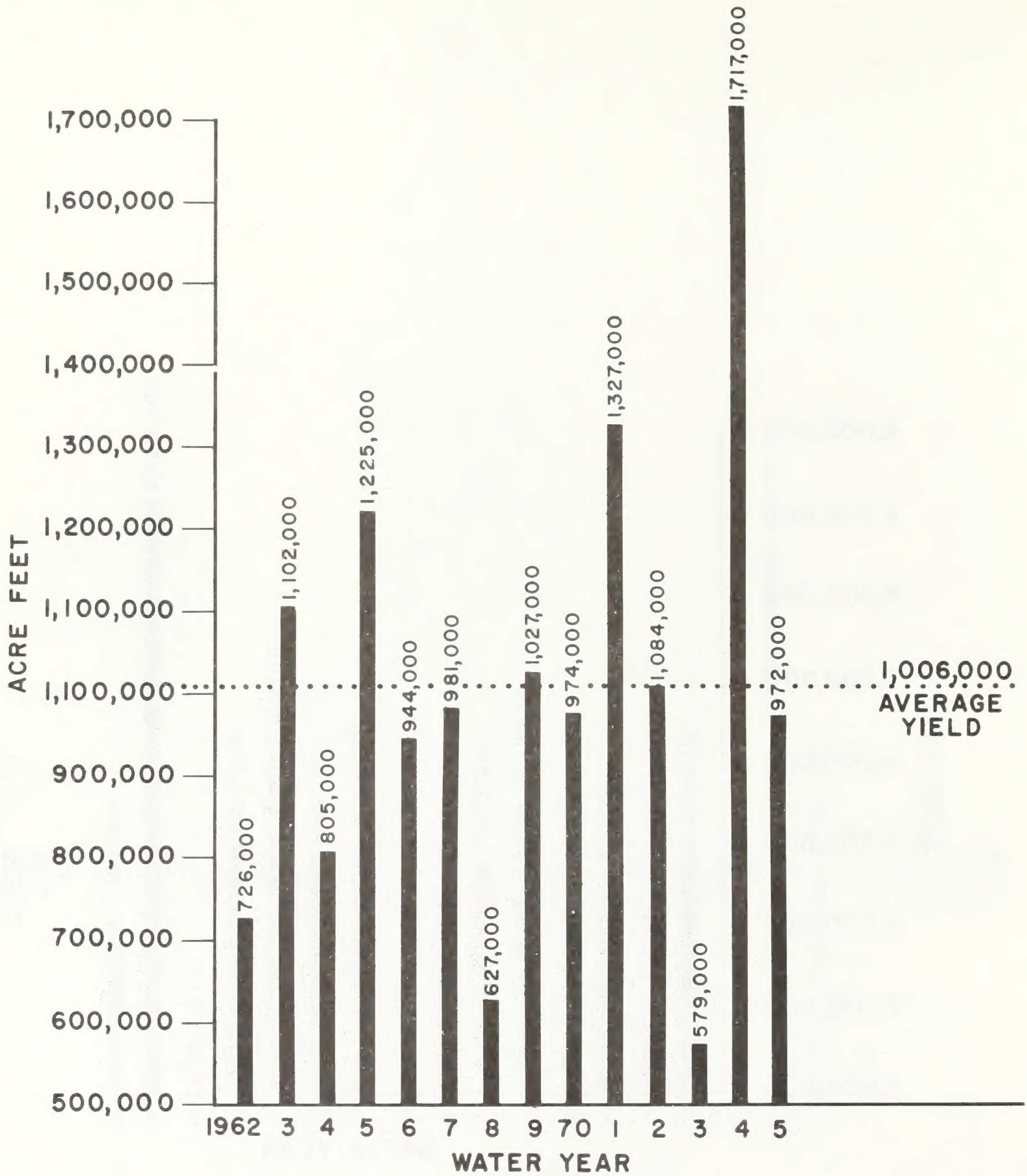
E-8 ANNUAL YIELD FOR ROGUE RIVER AT AGNESS, OREGON 1961 • 1975

SOURCE: USGS File Data



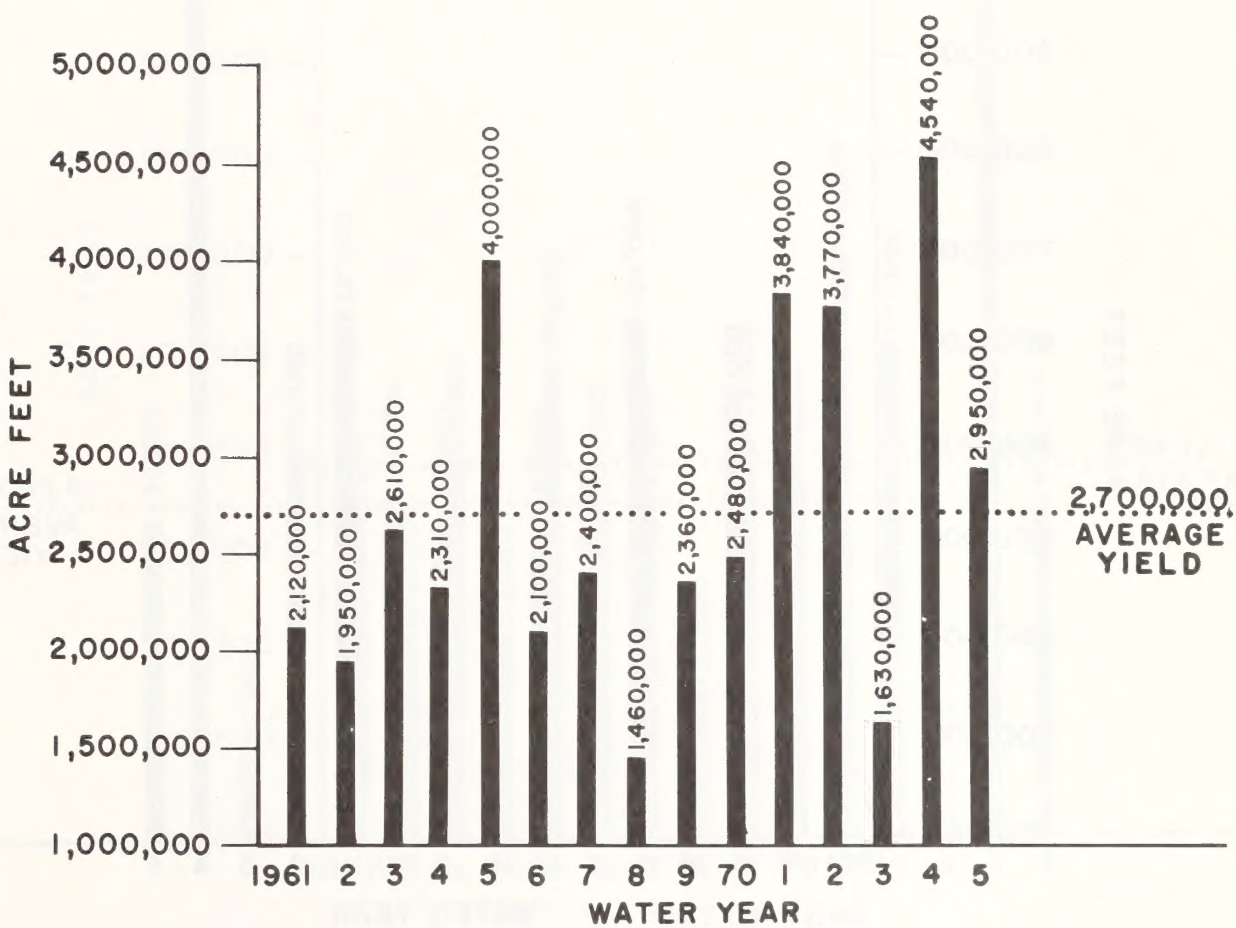
E-9 ANNUAL YIELD FOR ILLINOIS RIVER NEAR AGNESS, OREGON 1961 • 1975

SOURCE: USGS File Data



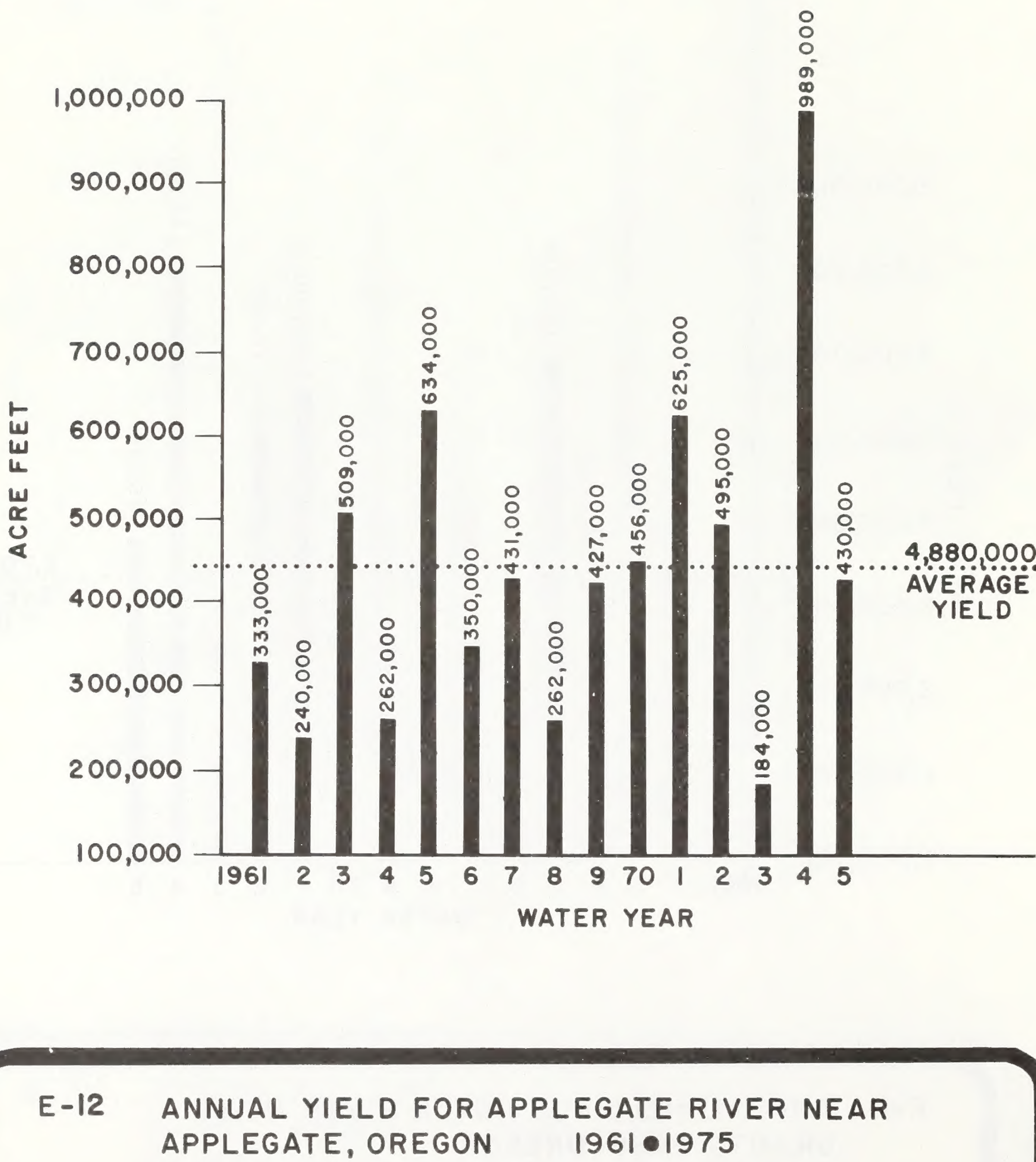
E-10 ANNUAL YIELD FOR ILLINOIS RIVER AT KERBY, OREGON 1962●1975

SOURCE: USGS File Data



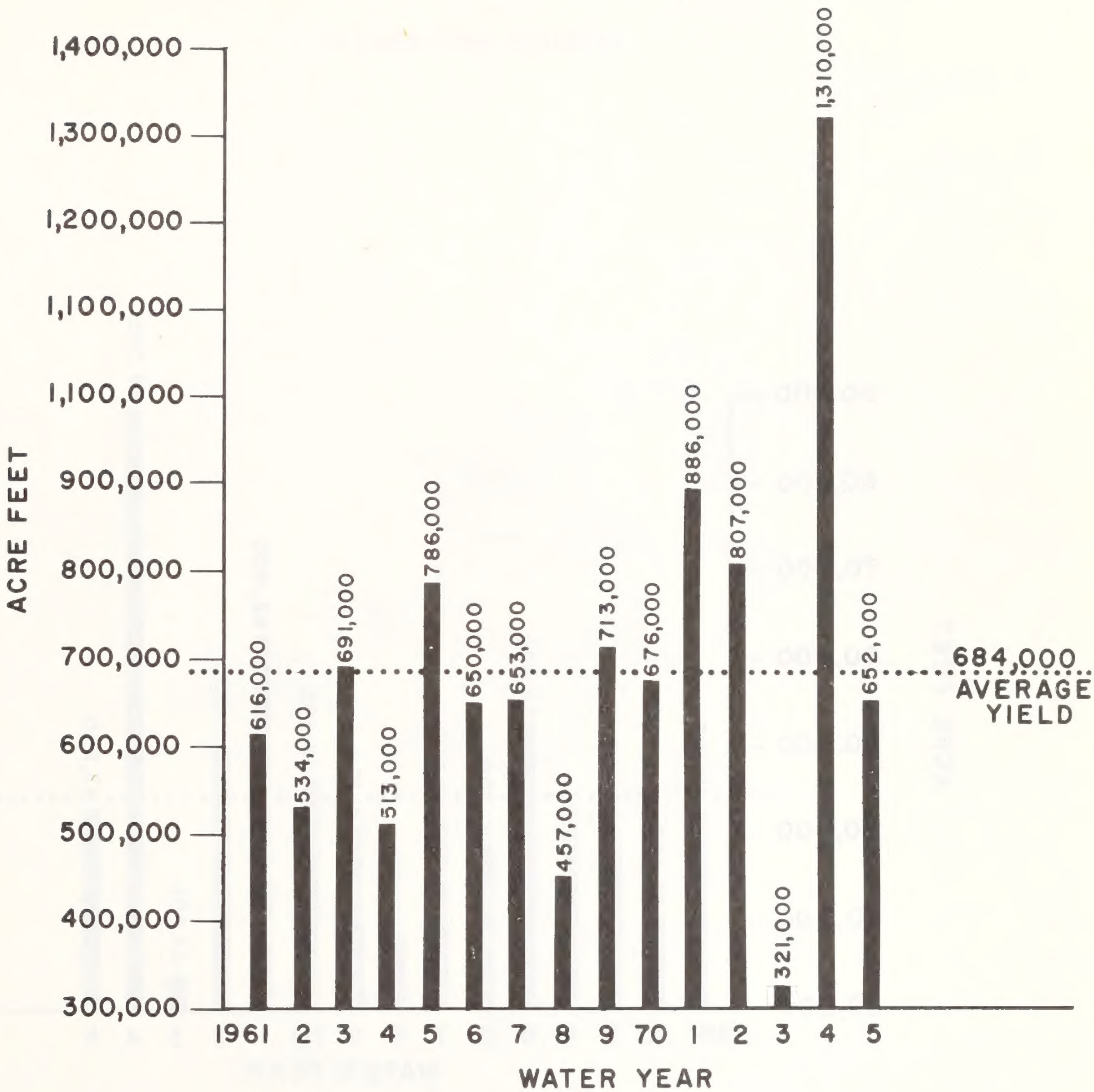
E-11 ANNUAL YIELD FOR ROGUE RIVER NEAR GRANTS PASS OREGON

SOURCE: USGS File Data

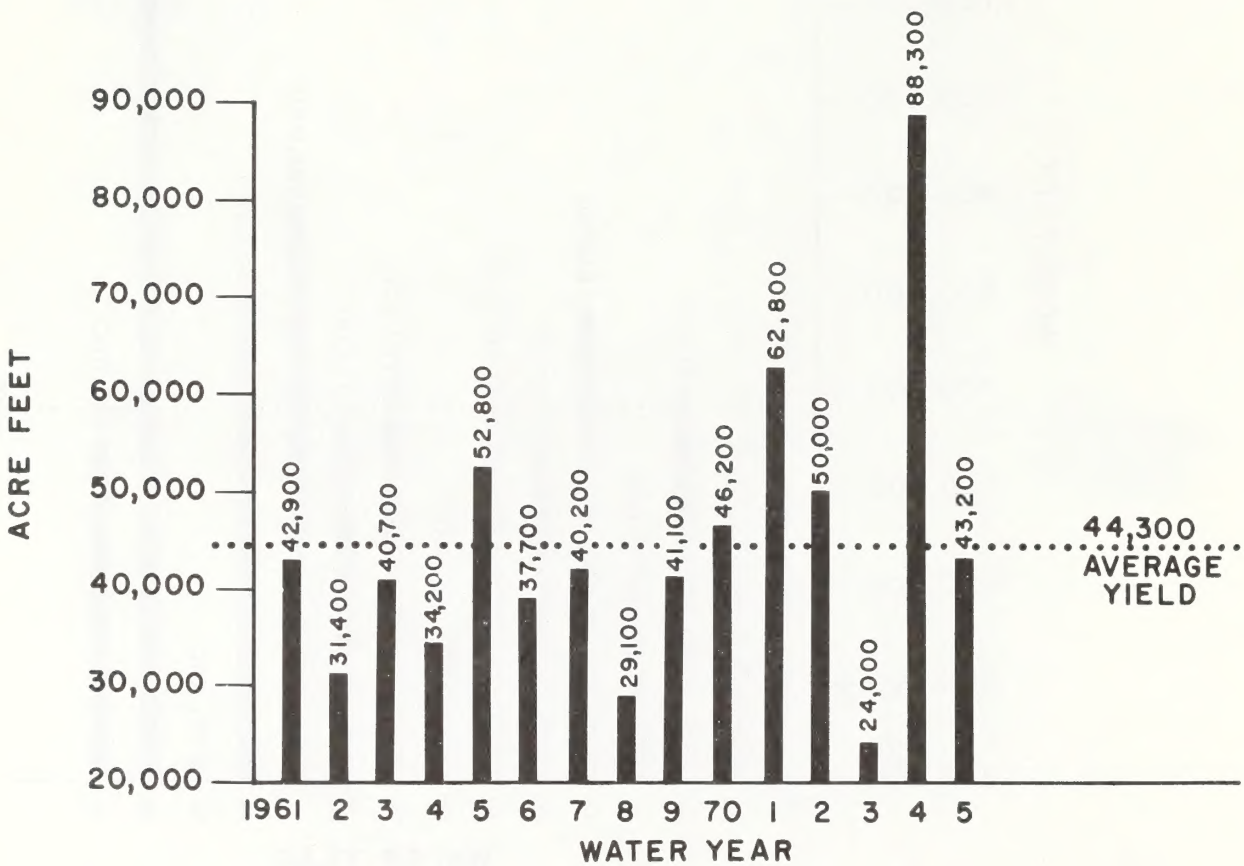


E-12 ANNUAL YIELD FOR APPLEGATE RIVER NEAR APPLEGATE, OREGON 1961•1975

SOURCE: USGS File Data



E-13 ANNUAL YIELD FOR COW CREEK AT RIDDLE, OREGON 1961 • 1975
SOURCE: USGS File Data



E-14 ANNUAL YIELD FOR GRAVE CREEK NEAR PLACER, OREGON 1961 • 1975

SOURCE: USGS File Data

APPENDIX F

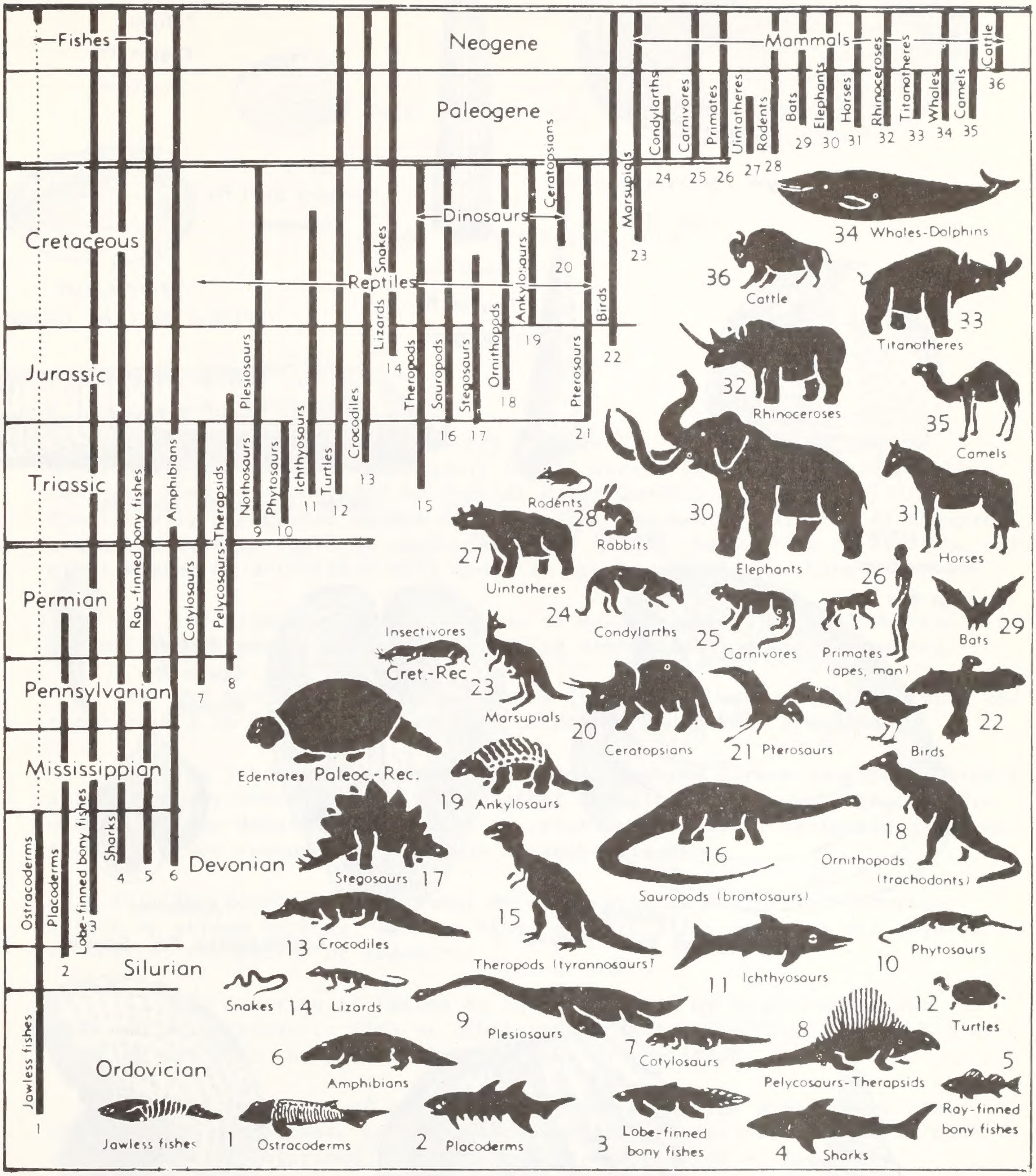
Paleontology Exhibits

GEOLOGIC TIME CHART

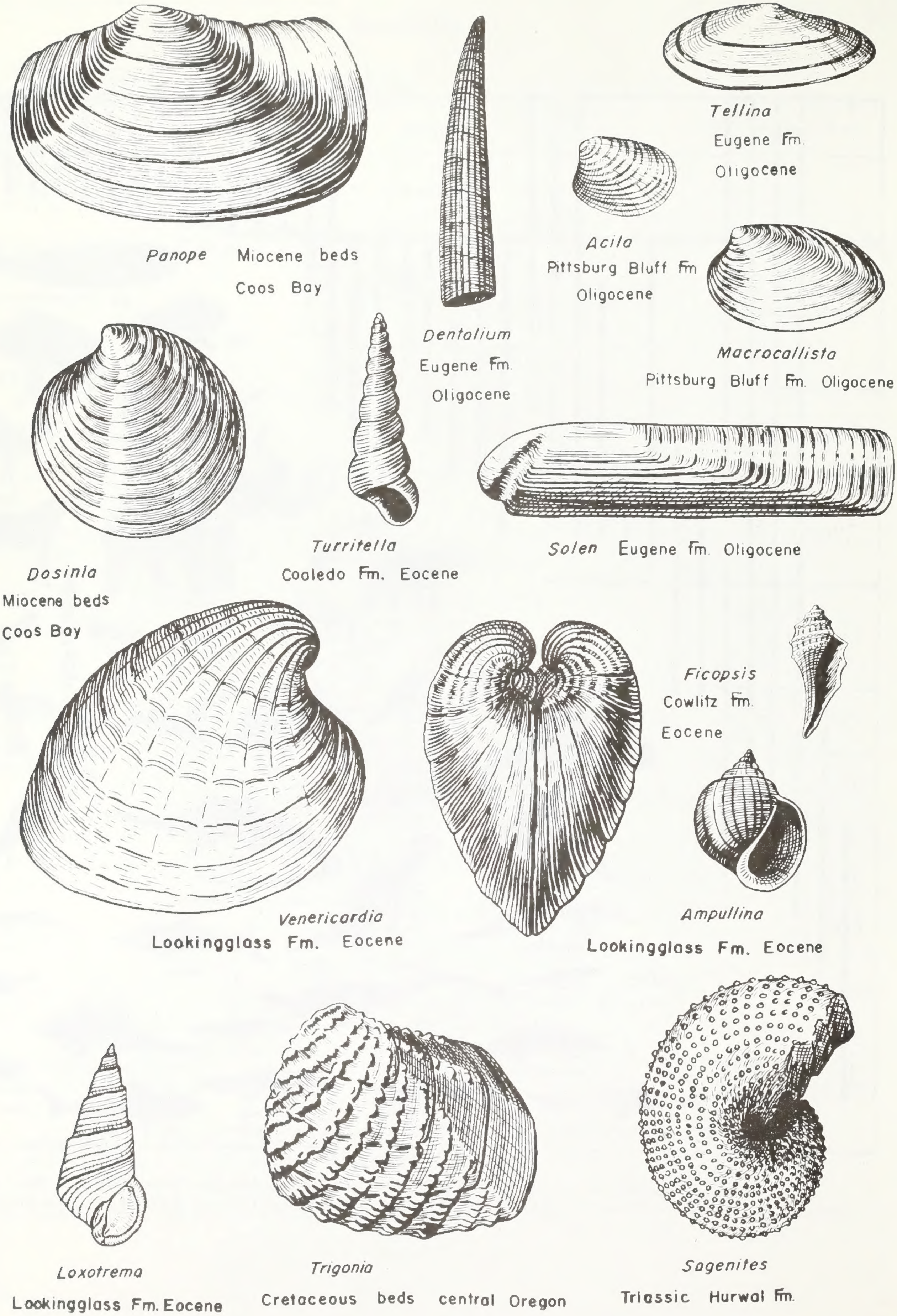
STRATIGRAPHIC DIVISIONS			TIME	DOMINANT LIFE	
ERA	SYSTEM OR PERIOD	SERIES OR EPOCH	Estimated ages of time boundaries in millions of years	ANIMALS	PLANTS
CENOZOIC	QUATERNARY	Holocene Pleistocene	2-3	Man	Flowering trees and shrubs
	TERTIARY	Pliocene	12	Mammals, birds, bony fish, mollusks, arthropods and insects	
		Miocene	26		
		Oligocene	37-38		
		Eocene	53-54		
		Paleocene	65		
MESOZOIC	CRETACEOUS	Upper (Late) Lower (Early)	136	Dinosaurs and Flying and swimming reptiles	Conifers, Cycads, Ginkgos and Ferns
	JURASSIC	Upper (Late) Middle (Middle) Lower (Early)	190-195		
	TRIASSIC	Upper (Late) Middle (Middle) Lower (Early)	225	Ammonites	
PALEOZOIC	PERMIAN	Upper (Late) Lower (Early)	280	Giant insects, Primitive reptiles & Amphibians	
	Carboniferous: PENNSYLVANIAN	Upper (Late) Middle (Middle) Lower (Early)			Scale trees, Cordaites, Calamites, and Tree ferns
	Carboniferous: MISSISSIPPIAN	Upper (Late) Lower (Early)	345	Crinoids and Blastoids	
	DEVONIAN	Upper (Late) Middle (Middle) Lower (Early)	395	Sharks & Lungfish	Primitive scale trees and tree ferns
	SILURIAN	Upper (Late) Middle (Middle) Lower (Early)	430-440	Corals,	Lycopods and Psilophytes
	ORDOVICIAN	Upper (Late) Middle (Middle) Lower (Early)	500	Brachiopods, and	
	CAMBRIAN	Upper (Late) Middle (Middle) Lower (Early)	570	Trilobites	Algae and Fungi
PRECAMBRIAN (More than 80% of earth's estimated 4.5 billion years falls within this era)			Z - base of Cambrian to 800 m.y. Y - 800 to 1,600 m.y. X - 1,600 to 2,500 m.y. W - older than 2,500 m.y. (U.S.G.S. Bull. 1394-A, 1974)	Beginning of primitive plant and animal life	

Oldest rocks known in Oregon: Limestones in central Oregon containing Middle Devonian fossils - about 370 million years old.
Oldest rocks known in North America: Granitic gneisses in Minnesota - 3550 million years old.
Oldest fossils known in the world: Algal stomatolites in southern Rhodesia - 2.7 billion years old.
Oldest rocks known in the world: Australia, Finland, South Africa, and North America have rocks about 3.5 billion years old.
Age of the earth: about 4.5 billion years old.

F-2 Geologic Time Chart.
SOURCE: Oregon Department of Geology and Mineral Industries



F-3 Geologic distribution of life forms. By Raymond C. Moore. Reprinted from AGI Data Sheet 29 (revised) published in GeoTimes, Vol. VI, No. 8 by the American Geological Institute. Published with permission.



F-4 Representative Oregon Fossils
SOURCE: Baldwin, 1976

APPENDIX G

PRESENT WATER QUALITY STANDARDS (EXCERPTS)

OREGON ADMINISTRATIVE RULES

CHAPTER 340

41-025 GENERAL WATER QUALITY STANDARDS. The following General Water Quality Standards shall apply to all waters of the state except where they are clearly superseded by Special Water Quality standards applicable to specifically designated waters of the state. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in any waters of the state:

(1) The dissolved oxygen content of surface waters to be less than six (6) milligrams per liter unless specified otherwise by special standard.

(2) The hydrogen-ion concentration (pH) of the waters to be outside the range of 6.5 to 8.5 unless specified otherwise by special standard.

(3) The liberation of dissolved gases, such as carbon-dioxide, hydrogen sulfide or any other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters.

(4) The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry.

(5) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish.

(6) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation or industry.

(7) Objectionable discoloration, turbidity, scum, oily sleek or floating solids, or coat the aquatic life with oil films.

(8) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or be otherwise injurious to public health.

(9) Any measurable increase in temperature when the receiving water temperatures are 64° F. or greater; or more than 0.5° F. increase due to a single-source discharge when receiving water temperatures are 63.5° F. or less, or more than 2° F. increase due to all sources combined when receiving water temperatures are 62° F. or less.

(10) Aesthetic conditions offensive to the human senses of sight, taste, smell or touch.

(11) Radioisotope concentrations to exceed Maximum Permissible Concentrations (MPC's) in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products or pose an external radiation hazard.

(12) The concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection to exceed one hundred and five percent (105%) of saturation, except when stream flow exceeds the 10-year, 7-day average flood.

41-080 SPECIAL WATER QUALITY AND WASTE TREATMENT STANDARDS FOR THE ROGUE RIVER BASIN.

(1) Special Water Quality Standards. The provisions of this sub-section shall be in addition to an not in lieu of the General Water Quality Standards contained in Section 41-025, except where this subsection imposes a conflicting requirement with the provisions of Section 41-025, this sub-section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in conjunction with other wastes or activities will cause in the waters of the Rogue River Basin:

(a) Organisms of the Coliform Group where associated with fecal sources (MPN or equivalent MF using a representative number of samples).

(A) Mainstem Rogue River from the point of salt water intrusion, approximately R.N. 4, upstream to Dodge Park, river mile 138.4, and Bear Creek; average concentrations to exceed 1000 per 100 milliliters, except during periods of high surface runoff.

(B) Rogue River above Dodge Park and all unspecified tributaries, average concentrations to exceed 240 per 100 milliliters, except during periods of high surface runoff.

(b) Dissolved Oxygen (D.O.). Dissolved oxygen concentrations to be less than 90 percent of saturation at seasonal low, or less than 95 percent of saturation in spawning areas during spawning, incubation, hatching, and fry stages of salmonid fishes.

(c) pH (Hydrogen Ion Concentration). pH values to fall outside the range of 7.0 to 8.5.

(d) Turbidity. (Jackson Turbidity Units, JTU). Any measurable increases in natural stream turbidities when natural turbudities are less than 30 JTU, or more than a 10 percent cumulative increase in natural stream turbidities when stream turbidities are more than 30 JTU, except for certain short-term activities which may be specifically authorized by the Department of Environmental Quality under such conditions as it may prescribe and which are necessary to accommodate essential dredging, construction, or other legitimate uses or activities where turbidities in excess of this standard are unavoidable.

(e) Temperature. Any measurable increase when stream temperatures are 58^{o} F. or greater; or more than 0.5^{o} F. increase due to a single-source discharge when receiving water temperatures are 57.5^{o} F or less or more than 2^{o} F. increase due to all sources combined with stream temperatures are 56^{o} F. or less, except for short-term activities which may be specifically authorized by the Department of Environmental Quality upon such conditions as it may prescribe and which are necessary to accommodate legitimate uses or activities where temperatures in excess of this standard are unavoidable.

(f) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Department of Environmental Quality upon such conditions as it may deem necessary to carry out the general intent of Section 41-010 and to protect the beneficial uses set forth in Table 11.

	mg/ℓ
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.003
Chloride (Cl)	25.0
Chromium (Cr)	0.02
Copper (Cu)	0.005
Cyanide (Cn)	0.005
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals	0.001
Total dissolved solids	100.0
Zinc (Zn)	0.01

(2) Minimum standards for treatment and control of wastes. All wastes shall be treated, prior to discharge, in accordance with the following:

(a) Sewage Wastes.

(A) During the period of low stream flows (approximately June 1 - October 31 of each year secondary treatment resulting in monthly average effluent concentrations not to exceed 20 mg/ℓ of 5-day 20^{o} C. Biochemical Oxygen Demand BOD) and 20 mg/ℓ of suspended solids or equivalent control.

(B) During the period of high stream flows (approximately November 1 - May 31 of each year) a minimum of secondary treatment or equivalent shall be provided and all waste treatment and control facilities shall be operated at maximum efficiency so as to minimize waste discharges to public waters.

(C) All sewage wastes shall be disinfected, after treatment, equivalent to thorough mixing with sufficient chlorine to provide a residual of at least 1 part per million after 60 minutes of contact time.

(D) More stringent waste treatment requirements may be imposed, especially in headwater and tributary streams, where waste loads may be large relative to stream flows.

(b) Industrial Wastes.

(A) Industrial waste treatment requirements shall be determined on an individual basis in accordance with the provisions of Sections 41-010, 41-015, 41-020, 41-025, and 41-030.

(B) Where industrial effluents contain significant quantities of potentially toxic elements, treatment requirements shall be determined utilizing appropriate bio-assays.

41-085 SPECIAL WATER QUALITY AND WASTE TREATMENT STANDARDS FOR THE UMPQUA RIVER BASIN

(1) Special Water Quality Standards. The provisions of this sub-section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 41-025, except where this subsection imposes a conflicting requirement with the provisions of Section 41-025, this sub-section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in conjunction with other wastes or activities shall cause in the waters of the Umpqua River Basin:

(a) Organisms of the Coliform Group where associated with fecal sources. (MPN or equivalent MF using a representative number of samples.)

(A) Mainstem Umpqua River from tidewater to South Umpqua River from mouth to near Canyonville (river mile 53), and Cow Creek from mouth to Glendale (river mile 42), average concentrations of coliform bacteria to exceed 1000 per 100 milliliters, except during periods of high surface runoff.

(B) North Umpqua River and all other unspecified stream sections and tributaries in the basin, average concentrations of coliform bacteria to exceed 240 per 100 milliliters, except during periods of high surface runoff.

(b) Dissolved Oxygen (D.O.). Dissolved oxygen concentrations to be less than 90 percent of saturation at the seasonal low, or less than 95 percent of saturation in spawning areas during spawning, incubation, hatching, and fry stages of salmonid fishes.

(c) pH (Hydrogen Ion Concentration). pH values to fall outside the range of 7.0 to 8.5.

(d) Turbidity (Jackson Turbidity Units, JTU). Any measurable increases in natural stream turbidities when natural turbidities are less than 30 JTU, or more than a 10 percent cumulative increase in natural stream turbidities when stream turbidities are more than 30 JTU, except for certain short-term activities which may be specifically authorized by the Department of Environmental Quality under such conditions as it may prescribe and which are necessary to accommodate essential dredging, construction, or other legitimate uses or activities where turbidities in excess of this standard are unavoidable.

(e) Temperature. Any measurable increases when stream temperatures are 58° F. or greater; or more than 0.5° F. increase due to a single-source discharge when receiving water temperatures are 57.5° F. or less; or more than 2° F. increase due to all sources combined when stream temperatures are

56° F. or less, except for certain short-term activities which may be specifically authorized by the Department of Environmental Quality under such conditions as it may prescribe and which are necessary to accommodate legitimate uses or activities where temperatures in excess of this standard are unavoidable.

(f) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Department of Environmental Quality upon such conditions as it may deem necessary to carry out the general intent of Section 41-010 and to protect the beneficial uses set forth in Table 11.

	mg/ℓ
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.003
Chloride (Cl)	25.0
Chromium (Cr)	0.02
Copper (Cu)	0.005
Cyanide (Cn)	0.005
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	100.0
Zinc (Zn)	0.01

(2) Minimum Standards for Treatment and Control of Wastes. All wastes shall be treated, prior to discharge, in accordance with the following:

(a) Sewage Wastes.

(A) During the period of low stream flows (approximately June 1 - October 31 of each year), secondary treatment resulting in monthly average effluent concentrations not to exceed 20 mg/ℓ of 5-day 20° C. Biochemical Oxygen Demand (BOC) and 20 mg/ℓ of suspended solids or equivalent control.

(B) During the period of high stream flows (approximately November 1 - May 31 of each year) a minimum of secondary treatment or equivalent shall be provided and all waste treatment and control facilities shall be operated at maximum efficiency so as to minimize waste discharges to public waters.

(C) All sewage wastes shall be disinfected, after treatment, equivalent to thorough mixing with sufficient chlorine to provide a residual of at least 1 part per million after 60 minutes of contact time.

(D) More stringent waste treatment requirements may be imposed, especially in headwaters and tributary streams, where waste loads may be large relative to stream flows.

(b) Industrial Wastes.

(A) Industrial waste treatment requirements shall be determined on an individual basis in accordance with the provisions of Sections 41-010, 41-015, 41-020, 41-025, and 41-030.

(B) Where industrial effluents contain significant quantities of potentially toxic elements, treatment requirements shall be determined utilizing appropriate bio-assays.

APPENDIX H

EMPLOYMENT IMPACTS IN THE MEDFORD TIMBERSHED ASSOCIATED WITH BUREAU OF LAND MANAGEMENT HARVESTING ALTERNATIVES IN THE JOSEPHINE SUSTAINED-YIELD UNIT

by

Brian R. Wall
Economist
1977

Pacific Northwest Forest and Range Experiment Station
Forest Service Portland, Oregon

Introduction

At the request of the Bureau of Land Management (BLM) the Pacific Northwest Forest and Range Experiment Station did a special study on forest industry employment in the Medford Timbershed of western Oregon. The BLM wanted to measure the direct employment impacts in the Medford Timbershed related to their various harvesting alternatives in the Josephine Sustained-Yield Unit. This report presents the findings of this study.

Timber Output

The first requirement in this study is that the basic assumptions and projections of timber output must be established. A model of the timber output for each ownership in the Medford Timbershed must be available. For this project, projection A-1 was selected from "Timber for Oregon's Tomorrow," (Beuter, et al., 1976). This run has a low level of management intensification. Run A-1 answers two questions: (1) Can the present annual harvest (based on the annual average of 1968-1973) be maintained to the year 2000 if public owners maintain their allowable cuts and private owners continue trying to fill the gap between public harvest and total harvest? (2) What is the capability for timber harvest after the year 2000 if policies and actions among owner classes in question (1) above are continued until the year 2000?

The average timber harvest in the Medford Timbershed for the 1968-73 period amounted to 603 million board feet. Under A-1 the harvest is projected to decline to 494 million board feet (down 18 per cent) by the year 2000. After the year 2000, the harvest rises to the 603 million board-foot level in 2010, then declines to 53 million board feet in 2020 and drops slightly to 592 million board feet in the year 2030. The decline in the output is caused by decline on forest industry lands. The Bureau of Land Management cut remains fairly constant throughout the projection period. This run has been used in this analysis as the No-Action Alternative for the BLM in the Josephine Sustained-Yield Unit. No reductions are made from the present allowable cut under this alternative. For other alternatives the reductions in BLM allowable cut in the Josephine and Jackson County portions of the JSYU are subtracted from Run A-1 to determine the new timber output levels. This assumes no timber harvest substitution from other sources occurs when BLM cut changes.

Employment Calculations

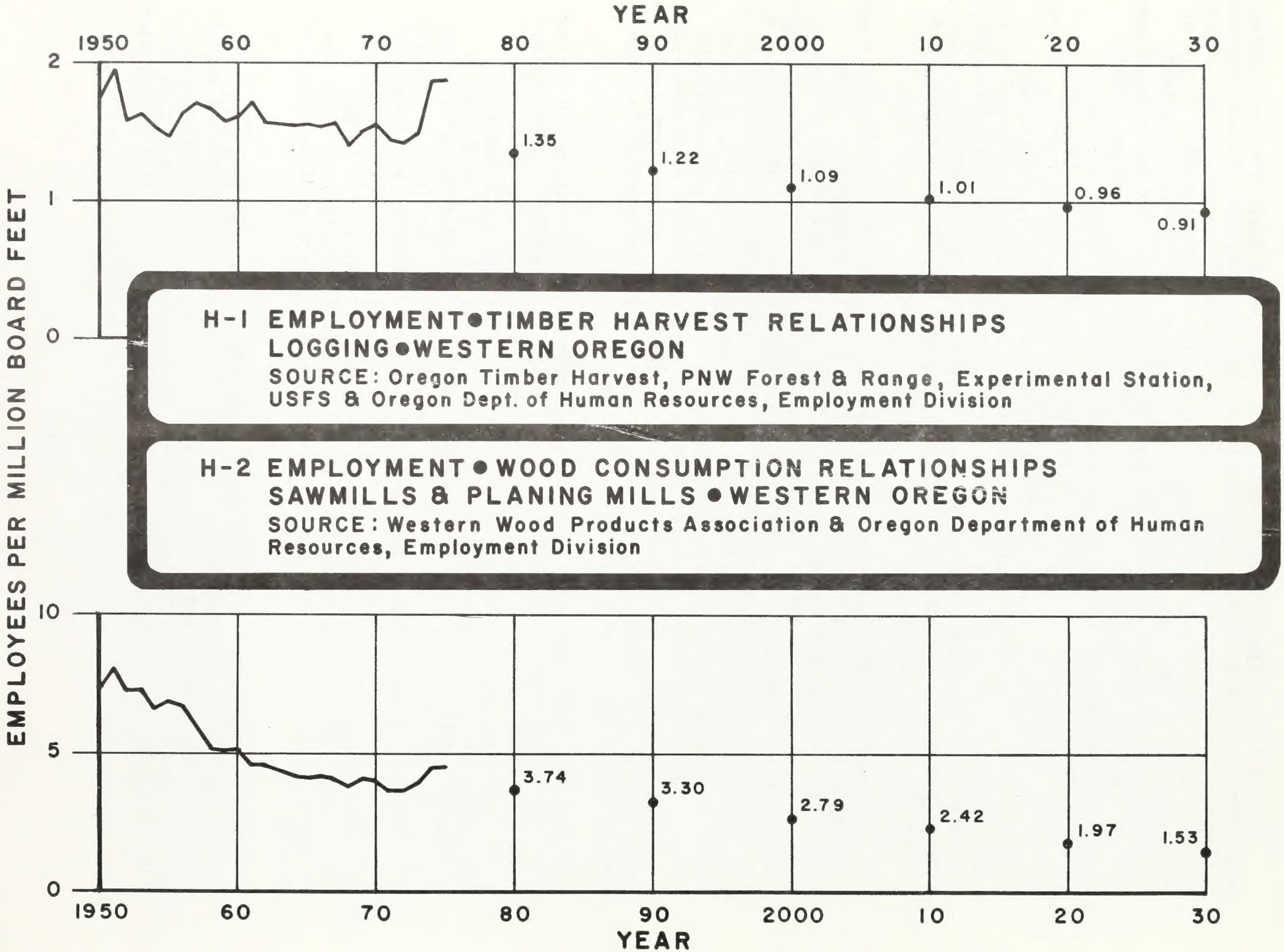
The next step in the analysis was to determine the direct employment supported by the timber harvest in the Medford Timbershed for the projection period. Employment was projected for logging, sawmills and planing mills, and veneer and plywood plants. Mill residue from the Medford Area supports pulp and paper manufacture in Oregon and so employment in pulp, paper, and building paper was calculated based on the mill residue supply. There are no pulpmills in the Medford Timbershed as this employment occurs elsewhere in the State.

In order to project logging employment, the relationship between logging employment and timber harvest was examined. Logging employment-timber harvest ratios were developed for western Oregon for the 1950-75 period. These ratios are plotted in Figure H-1. Between 1950 and 1973 the ratios show a declining trend indicating that productivity has been increasing. In 1974 and 1975, when there was a sharp recession and log harvest dropped, the employment-timber harvest ratios rose to levels experienced in the 1950's. It is not likely that these are representative of the future where high demand for timber products is projected. A regression of employment ratios over time was developed for the 1950-73 and 1950-75 periods. The regression for the 1950-73 period was chosen and extrapolated into the future. This regression was modified to show a reduced rate of productivity after the year 2000 due to the smaller timber site projected for that period. At the end of the projection, the rate declines 5 per cent per decade. To project logging employment, the extrapolated employment-timber harvest ratios are mutiplied by the projected harvest for each time period.

Employment-wood consumption relationships were developed for sawmills and planing mills in western Oregon for the 1950-75 period (Figure H-2). The ratios declined rapidly during the 1950's and declined more slowly in later years. A regression relating employment-wood consumption ratios was developed for the 1960-75 period. This linear relationship is downward sloping showing the effects of increasing productivity. This relationship was extrapolated to the year 2030. New sawmill technology is developing at a rapid pace and it seems reasonable to assume that this new technology will be utilized in the Medford Timbershed in the future. Firms will have to compete with sawmills utilizing new technology elsewhere on the Pacific Coast. The extrapolated relationships were multiplied by the projected saw log consumption for each time period to arrive at projected employment.

For the veneer and plywood industry, employment-wood consumption ratios were calculated for the 1950-75 period for Oregon (Figure H-3). The employment ratios decline sharply during the 1952-64 period and then decline more slowly for the last 10 years. It is evident that productivity has been increasing and we can expect it to continue to increase. A regression of employment ratios related to time was developed for the 1965-75 period. This regression was extrapolated to the year 1990 and then a slower rate of change was assumed. It was assumed that productivity would increase at 10 per cent per decade in the latter part of the projection period. When extrapolated too far, historic rates of change often produce absurd results. To project veneer and plywood employment, the extrapolated employment-wood consumption ratios were multipled by the projected veneer-log consumption for each point in time.

For the pulp, paper, and building paper industries (SIC 2611, 21, 31, 61) in Oregon, employment-wood consumption ratios were calculated for the 1958-74 period (Figure H-4). The ratios decline rapidly showing the sharp gains in productivity. The ratios show a slower rate of decline during the 1966-74 period and it was extrapolated to 1980. No new pulpmills are planned



H-1 EMPLOYMENT • TIMBER HARVEST RELATIONSHIPS LOGGING • WESTERN OREGON

SOURCE: Oregon Timber Harvest, PNW Forest & Range, Experimental Station, USFS & Oregon Dept. of Human Resources, Employment Division

H-2 EMPLOYMENT • WOOD CONSUMPTION RELATIONSHIPS SAWMILLS & PLANING MILLS • WESTERN OREGON

SOURCE: Western Wood Products Association & Oregon Department of Human Resources, Employment Division

for Oregon and people in the industry expect productivity increases to slow down for new investment will mean incremental changes in productivity in existing plant facilities. It is not logical for the present rate of change in the employment ratios to continue. Therefore, it was assumed that after 1980 the employment ratios would decline at 10 per cent per decade. The trend employment ratios for 1970 was 1.64 employees per thousand tons of wood consumption and by 1980 this would drop to 1.1078 employees per thousand tons. By 2030 the ratio is projected to drop to 0.654 employees per thousand tons. Pulp, paper, and building paper employment was calculated by multiplying the employment-wood consumption ratio by the projected wood consumption for this industry.

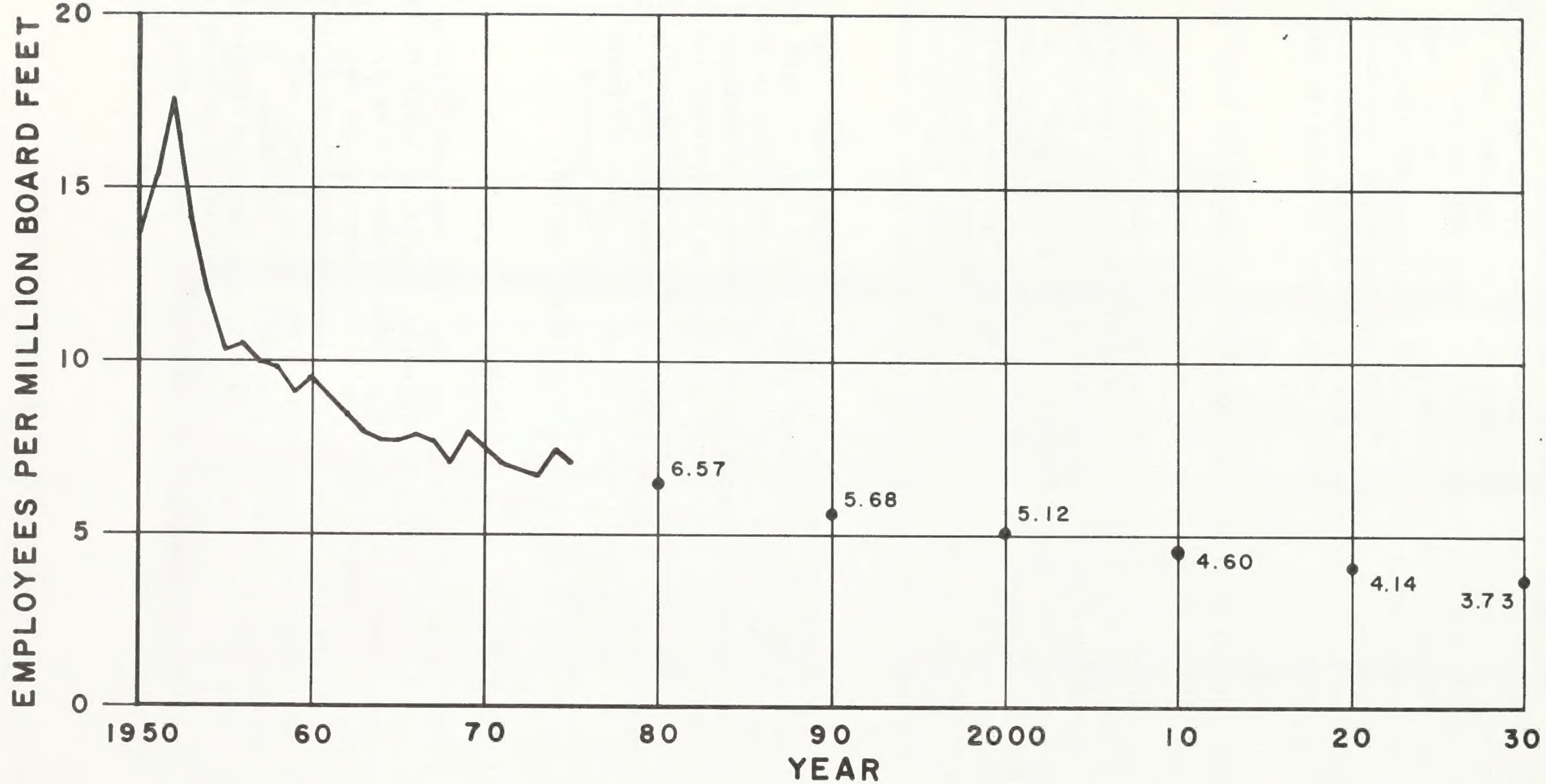
Projected timber harvest will support logging employment in each time period in the Medford Timbershed.

The next step was to calculate saw log consumption and veneer log consumption for the Medford Timbershed. In 1972 it was found that about 48 per cent of the roundwood consumption in Jackson and Josephine Counties went to sawmills. About 52 per cent went to veneer and plywood plants. It is assumed that this distribution of logs remains constant for the projection period. Future saw log consumption which will support Medford Timbershed employment was 48 per cent of the projected harvest in each time period. Future veneer log consumption was 52 per cent of the future log harvest. Employment in sawmills and veneer and plywood plants was then calculated for the projection period.

There are no pulp or paper plants in the Medford Timbershed. The residue from sawmills and veneer and plywood plants will support pulp and paper employment elsewhere in Oregon. A wood residue projection is made to determine the pulpwood consumption supported by the Medford Timbershed. The production of lumber and plywood was calculated for the timbershed for the projection period. Knowing the production of lumber and plywood, the volume of coarse residue generated was calculated for the timbershed for the projection period. Not all of the coarse residue is used for pulp and paper. It was assumed that 79 per cent of the residue supply will be consumed for pulp and paper manufacture in Oregon during the projection period.

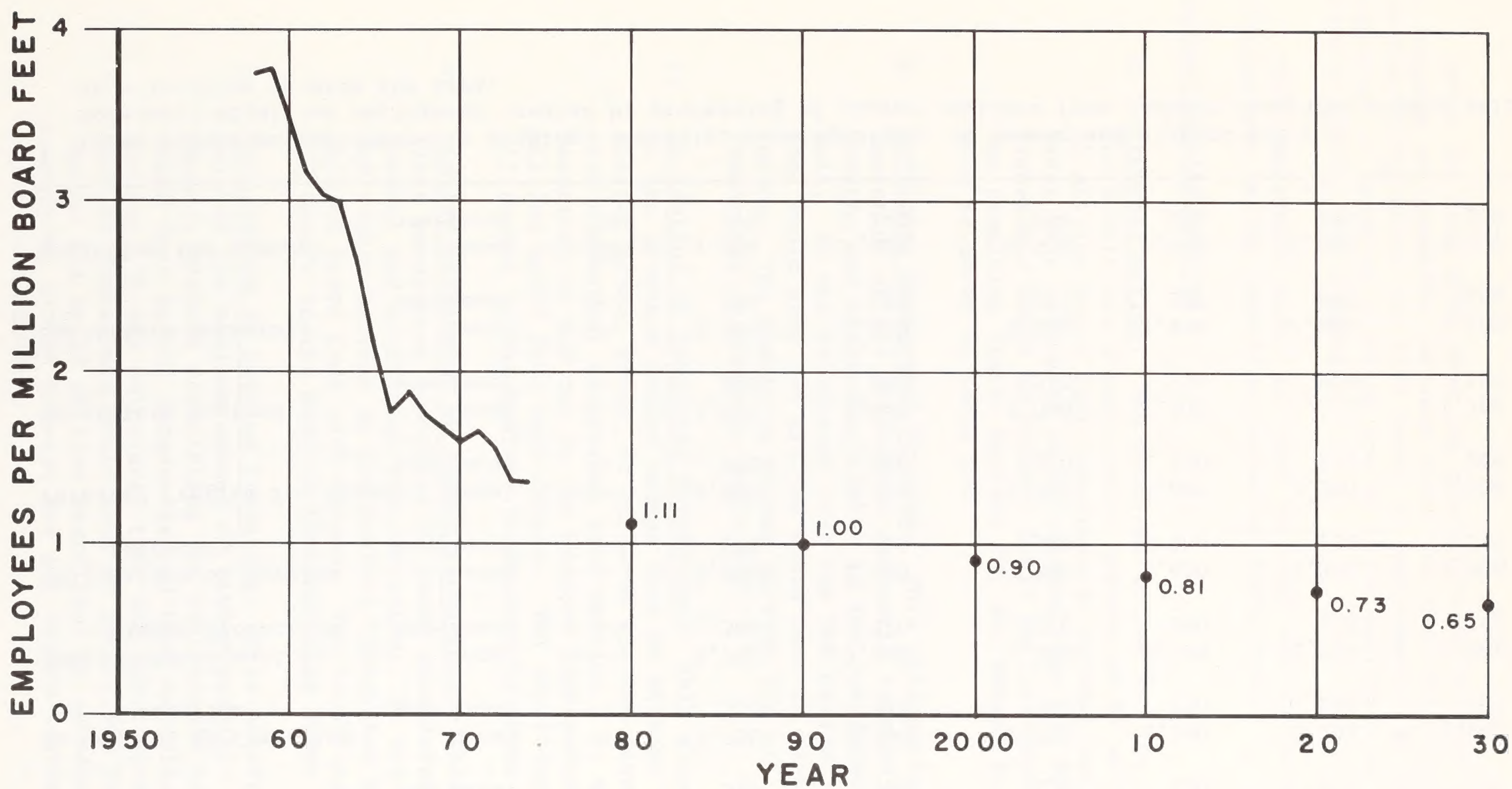
Employment Projection for Beuter et al., Run A-1

Based on the 1968-73 average harvest and the 1970 employment ratios, it was calculated that the Medford Timbershed harvest supported 4,434 employees in logging sawmills, and veneer and plywood plants. Under the Beuter's Run A-1, employment in these categories will drop 43 per cent by the year 2000 due to increases in productivity and decreases in timber harvest. In 1970 it was calculated that 566 employees were supported in the pulp, paper, and building paper industry in Oregon by residues from the Medford Timbershed. By the year 2000, only 250 employees will be supported in pulp and paper in Oregon based on the Medford timber harvest. This employment projection is the result of the BLM's No-Action timber harvesting alternative. The results of this run are presented in Table H-1.



H-3 EMPLOYMENT • WOOD CONSUMPTION RELATIONSHIPS
VENEER & PLYWOOD • OREGON

SOURCE: American Plywood Association & Oregon Department of Human Resources, Employment Division



H–4 EMPLOYMENT • WOOD CONSUMPTION RELATIONSHIPS PULP & PAPER • OREGON

SOURCE: Northwest Pulp & Paper Association & Oregon Department of Human Resources, Employment Division

Table H-1
Employment Supported in Logging and Primary Processing by Timber Harvest in the Medford Timbershed under Timber Harvest Alternatives for BLM:
Josephine Sustained Yield Unit

BLM Management Alternatives		1970	1975-1985	1985-1995	1995-2005	2005-2015	2015-2025	2025-2035
Proposed Action	Local[1]	--	3,800	3,200	2,300	2,500	2,300	2,000
	non-local[2]	--	370	320	320	260	230	210
No Timber Mgmt. Program	Local	--	2,300	2,800	2,000	2,300	2,000	1,700
	non-local	--	320	280	270	230	200	180
No Control of Competing Vegetation	Local	--	3,700	3,100	2,200	2,500	2,200	1,900
	non-local	--	350	310	300	250	220	200
Limited Investment in Timber Production	Local	--	3,700	3,200	2,300	2,500	2,200	1,900
	non-local	--	360	310	310	260	230	200
Utilization of Surplus Inventory	Local	--	3,800	3,200	2,300	2,600	2,300	2,000
	non-local	--	370	320	320	260	230	210
Forestry Program for Oregon	Local	--	3,800	3,300	2,400	2,600	2,200	1,900
	non-local	--	370	330	320	270	230	200
Substitute Sources	Local	--	3,300	2,800	2,000	2,300	2,000	1,700
	non-local	--	320	280	270	230	200	180
Substitute Materials	Local	--	3,300	2,800	2,000	2,300	2,000	1,700
	non-local	--	320	280	270	230	200	180
No Action (no change)	Local	4,434	4,000	3,400	2,500	2,800	2,400	2,100
	non-local	566	390	340	250	280	250	220

1 Local signifies employment in logging, sawmills, planing mills, or veneer and plywood mills.
2 Non-local signifies employment created by processing of coarse residues from Jackson-Josephine County mills at a location outside the area.

After the year 2000 when log production in Run A-1 increases, employment in logging and sawmills increase above the year 2000 level, but remains substantiallly below the 1970 level of employment. By 2030 employment is projected to reach an all-time low of 2,100 employees in sawmills, veneer and plywood plants, and logging.

This employment model was used for each one of the BLM's timber harvest alternatives in the Josephine Sustained Yield Unit.

Harvesting Alternatives

a. Proposed Action. The proposed action for the Josephine Sustained Yield Unit has a sustainable harvest of 94 million board feet plus 12 million board feet experimental harvest during the first decade. Under this action it is calculated that the BLM cut in the Medford Timbershed would be reduced by 29 million board feet in each decade. The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

b. No-Timber Management Program. This alternative would require cessation of all activities currently carried out for the purpose of growing and harvesting timber in the Josephine Sustained-Yield Unit. It was calculated that the BLM harvest in the Medford Timbershed would drop 105 million board feet in each decade into the future. The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

c. No Control of Competing Vegetation. This alternative is identical to the proposed action except that no attempt would be made to control grass, brush, or hardwood species growing in competition with commercial coniferous tree species. It was calculated that the reduction of BLM cut in the Medford Timbershed would amount to 51 million board feet each decade. The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

d. Limited Investment in Timber Production. This alternative would limit management practices to those associated with final timber harvest and artificial reforestation. It was calculated that the BLM timber harvest in the Medford Timbershed would be reduced by 41 million board feet each decade. The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

e. Utilization of Surplus Inventory. This alternative would direct the sale of the maximum amount of timber possible during the first decade, without diminishing the sustainable harvest of 94 million board feet in the decades beyond that as called for in the proposed action. It was calculated that the BLM timber harvest in the Medford Timbershed would drop by 26 million board feet in the first decade and by 37 million board feet in subsequent decades. The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

Table H-2
Timber Harvest for all Sources in the Medford Timbershed Under
Timber Harvest Alternatives for BLM:
Josephine Sustained Yield Unit[1]

BLM Harvesting Alternative	Decade 1968-78	1975-1985	1985-1995	1995-2005	2005-2015	2015-2025	2015-2025
	-(million board feet (scribner))-						
Proposed Action	--	580	562	456	565	556	554
No Timber Mgmt. Program	--	504	494	389	498	488	486
No Control of Competing Vegetation	--	558	540	438	544	534	533
Limited Investment in Timber Production	--	568	549	444	553	544	542
Utilization of Surplus Inventory	--	583	562	456	565	556	554
Forestry Program for Oregon	--	586	569	466	580	542	540
Alternative Sources of Timber	--	504	494	389	498	488	486
Alternative Materials	--	504	494	389	498	488	486
No Action (No change)	603	609	599	494	603	593	592

1 Differences among alternatives reflect only the portion of the JSYU contained within the boundaries of the Medford Timbershed.

f. Forestry Program for Oregon. This alternative is designed to provide the Josephine Sustained-Yield Unit's pro-rata share of BLM timber harvest called for in the recent State publication, "Forestry Program for Oregon." The BLM harvest was reduced in the Medford Timbershed as follows:

Decade	Reduced harvest Million board feet
1	23
2	30
3	28
4	23
5+	51

The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

g. Substitute Sources. Same as (b.), No Timber Management Program.

h. Substitute Materials. Same as (b.), No Timber Management Program

i. No Action. This alternative assumes continuation of the current level of timber management on the Josephine Systained-Yield Unit; that is, continuation of the current allowable cut of 146 million board feet on the present timber management base. There would be no reduction of BLM cut in the Medford Timbershed in decades 1 through 9. In the 10th and subsequent decades, the reduction would be 42.5 million board feet. The resulting timber harvest for all owners in the Medford Timbershed is shown in Table H-2.

Employment Impacts

Direct employment was calculated for the Medford Timbershed for each BLM alternative. Employment was calculated for logging, sawmills and planing mills, and veneer and plywood plants. Employment based on imports into the timbershed was not calculated. Miscellaneous lumber and wood products employment not directly affected by the timber harvest alternatives was not included. Pulp and paper employment in Oregon supported by primary mill residues was calculated. The employment results are presented in Table H-1.

It is concluded that the highest employment levels are generated by the BLM: No-Action alternative. The lowest employment levels are shown under the No-Timber Management alternative.

All of the employment projections show declining employment for the Medford Timbershed. Increases in labor productivity account for most of this decline. Also between 1970 and 2000 employment drops because timber output is projected to decline. This is due to the declining harvest on forest industry lands.

APPENDIX I

Per Capita and Total Personal Income by Major Sources; Oregon, Coos County, Curry County, Douglas County, Jackson County and Josephine County --- 1970 to 1975

Source: Bureau of Economic Analysis

PERSONAL INCOME BY MAJOR SOURCES 1970-75 (THOUSANDS OF DOLLARS)

ITEM	1970	1971	1972	1973	1974	1975
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/						
BY TYPE						
WAGE AND SALARY DISBURSEMENTS 2/	5,089,477	5,508,845	6,155,604	6,930,150	7,667,029	8,222,172
OTHER LABOR INCOME	272,224	318,220	376,857	429,388	499,858	560,597
PROPRIETORS INCOME	793,995	844,512	952,660	1,186,184	1,312,851	1,199,299
FARM	142,250	140,187	215,287	385,369	469,508	307,096
NONFARM	651,745	704,325	737,373	800,815	843,343	892,203
BY INDUSTRY						
FARM	207,176	204,304	274,251	462,432	547,067	412,746
NONFARM	5,948,520	6,467,273	7,210,870	8,083,290	8,932,671	9,569,322
PRIVATE	4,868,444	5,286,572	5,913,647	6,648,165	7,330,267	7,772,089
MANUFACTURING	1,563,048	1,689,634	1,918,342	2,179,084	2,385,491	2,441,774
MINING	13,093	15,529	17,165	20,869	25,601	25,167
CONTRACT CONSTRUCTION	368,071	409,920	490,360	546,972	609,416	604,306
WHOLESALE AND RETAIL TRADE	1,187,449	1,290,593	1,415,291	1,594,545	1,766,171	1,932,454
FINANCE, INSURANCE, AND REAL ESTATE	296,056	327,077	360,440	389,880	417,734	459,850
TRANSP., COMM. + PUBLIC UTILITIES	507,050	546,447	602,840	675,657	722,939	761,296
SERVICES	903,370	973,647	1,072,749	1,193,129	1,347,660	1,487,151
OTHER INDUSTRIES	30,307	33,725	36,460	48,029	55,275	60,091
GOVERNMENT	1,080,076	1,180,701	1,297,223	1,435,125	1,602,364	1,797,233
FEDERAL, CIVILIAN	263,775	283,930	308,329	326,715	362,954	392,468
FEDERAL, MILITARY	52,175	51,342	54,855	60,590	76,285	75,991
STATE AND LOCAL	764,126	845,429	934,039	1,047,820	1,163,145	1,328,774
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE						
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	6,155,696	6,671,577	7,485,121	8,545,722	9,479,738	9,982,068
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	268,059	328,213	375,919	454,773	521,418	547,807
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	5,887,637	6,343,364	7,109,202	8,090,949	8,958,320	9,434,261
PLUS: RESIDENCE ADJUSTMENT	-66,621	-68,218	-75,375	-94,769	-109,302	-105,837
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	5,821,016	6,275,146	7,033,827	7,996,180	8,849,018	9,328,424
PLUS: DIVIDENDS, INTEREST, AND RENT	1,136,973	1,261,662	1,342,456	1,499,071	1,762,577	1,927,304
PLUS: TRANSFER PAYMENTS	855,936	985,310	1,080,329	1,253,577	1,544,003	1,907,629
PERSONAL INCOME BY PLACE OF RESIDENCE	7,813,925	8,522,138	9,456,612	10,748,828	12,155,598	13,163,357
PER CAPITA INCOME	3,719	3,992	4,328	4,843	5,390	5,752
TOTAL POPULATION (THOUSANDS)	2,101.0	2,135.0	2,184.8	2,219.4	2,255.4	2,288.5

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - OREGON EMPLOYMENT DIVISION

TABLE 5.00

REGIONAL ECONOMICS INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

ITEM	1970	1971	1972	1973	1974	1975
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/						
BY TYPE						
WAGE AND SALARY DISBURSEMENTS 2/	174,637	199,620	230,094	252,516	286,210	311,086
OTHER LABOR INCOME	8,331	10,400	12,779	14,622	15,640	19,199
PROPRIETORS INCOME	30,991	40,254	40,074	45,829	52,160	46,575
FARM	3,184	9,576	7,144	9,948	14,412	6,785
NONFARM	27,807	30,678	32,930	35,881	37,748	39,790
BY INDUSTRY						
FARM	6,918	13,276	10,564	14,391	18,886	12,891
NONFARM	207,041	236,998	272,383	308,576	336,124	363,969
PRIVATE	168,509	195,089	226,249	255,522	275,507	294,513
MANUFACTURING	54,950	65,551	77,914	84,580	83,054	85,518
MINING	205	207	207	357	1,906	2,221
CONTRACT CONSTRUCTION	10,795	14,401	17,874	25,568	27,564	28,081
WHOLESALE AND RETAIL TRADE	44,098	49,871	56,314	63,727	71,345	78,795
FINANCE, INSURANCE, AND REAL ESTATE	6,377	7,005	8,182	9,506	9,578	10,414
TRANSP., COMM. + PUBLIC UTILITIES	16,772	18,551	20,485	22,963	25,081	25,872
SERVICES	33,089	36,739	42,200	47,466	53,780	60,063
OTHER INDUSTRIES	2,157	2,764	3,075	3,355	3,199	3,549
GOVERNMENT	38,532	41,907	46,134	53,054	60,617	69,456
FEDERAL, CIVILIAN	10,303	11,139	12,586	13,993	16,097	18,219
FEDERAL, MILITARY	1,351	1,441	1,680	1,932	2,160	2,373
STATE AND LOCAL	26,878	29,327	31,868	37,129	42,360	48,864
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE						
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	213,959	250,274	282,947	322,967	355,010	376,860
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	9,396	11,962	14,318	17,514	19,822	21,041
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	204,563	238,312	268,629	305,453	335,188	355,819
PLUS: RESIDENCE ADJUSTMENT	3,910	4,419	4,894	5,472	5,520	6,090
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	208,473	242,731	273,523	310,925	340,708	361,909
PLUS: DIVIDENDS, INTEREST, AND RENT	52,422	58,621	63,562	72,596	86,616	94,415
PLUS: TRANSFER PAYMENTS	42,715	48,577	54,336	65,030	82,851	102,401
PERSONAL INCOME BY PLACE OF RESIDENCE	303,610	349,929	391,421	448,551	510,175	558,725
PER CAPITA INCOME	3,197	3,545	3,903	4,217	4,649	4,916
TOTAL POPULATION (THOUSANDS)	95.0	98.7	100.3	106.4	109.7	113.7

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - OREGON EMPLOYMENT DIVISION

ITEM	1970	1971	1972	1973	1974	1975
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/						
BY TYPE						
WAGE AND SALARY DISBURSEMENTS 2/	156,823	181,399	207,922	233,940	255,150	269,843
OTHER LABOR INCOME	7,561	9,227	11,337	12,967	15,034	17,494
PROPRIETORS INCOME	20,261	20,880	24,696	30,684	31,476	30,301
FARM	36	-1,191	168	3,317	2,827	608
NONFARM	20,225	22,071	24,528	27,367	28,649	29,693
BY INDUSTRY						
FARM	715	-521	785	4,124	3,639	1,716
NONFARM	185,930	212,027	243,170	273,467	298,021	315,922
PRIVATE	151,332	174,189	201,639	226,613	244,598	254,535
MANUFACTURING	83,959	98,773	116,148	129,931	137,199	137,030
MINING	2,134	2,419	2,451	3,225	4,307	3,726
CONTRACT CONSTRUCTION	9,458	11,302	14,066	15,602	16,565	17,733
WHOLESALE AND RETAIL TRADE	23,062	25,872	28,991	32,215	35,445	39,864
FINANCE, INSURANCE, AND REAL ESTATE	3,864	4,566	4,937	5,382	5,644	6,359
TRANSP., COMM. + PUBLIC UTILITIES	6,967	10,605	11,786	13,136	14,889	16,020
SERVICES	18,042	19,547	21,910	25,378	28,621	31,966
OTHER INDUSTRIES	1,226	1,107	1,350	1,744	1,906	1,835
GOVERNMENT	34,598	37,838	41,531	46,854	53,423	61,387
FEDERAL, CIVILIAN	12,372	13,391	14,720	15,368	17,385	19,808
FEDERAL, MILITARY	1,092	1,148	1,349	1,552	1,729	1,926
STATE AND LOCAL	21,134	23,299	25,462	29,934	34,309	39,653
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE						
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	186,645	211,506	243,955	277,591	301,660	317,638
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	8,601	11,274	13,106	15,915	18,004	18,643
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	178,044	200,232	230,849	261,676	283,656	298,995
PLUS: RESIDENCE ADJUSTMENT	-3,344	-4,032	-4,717	-5,252	-5,864	-6,220
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	174,700	196,200	226,132	256,424	277,792	292,775
PLUS: DIVIDENDS, INTEREST, AND RENT	28,650	32,878	36,690	42,174	50,148	54,718
PLUS: TRANSFER PAYMENTS	27,577	30,898	33,940	40,015	49,416	61,705
PERSONAL INCOME BY PLACE OF RESIDENCE	230,927	259,976	296,762	338,613	377,356	409,198
PER CAPITA INCOME	3,204	3,525	3,978	4,270	4,684	4,978
TOTAL POPULATION (THOUSANDS)	72.1	73.8	74.6	79.3	80.6	82.2

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - OREGON EMPLOYMENT DIVISION

TABLE 5.00

REGIONAL ECONOMICS INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

JOSEPHINE — OREGON — PERSONAL INCOME BY MAJOR SOURCES 1970-75 (THOUSANDS OF DOLLARS)

ITEM	1970	1971	1972	1973	1974	1975
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/						
BY TYPE						
WAGE AND SALARY DISBURSEMENTS 2/	56,039	64,733	74,603	86,142	89,049	99,313
OTHER LABOR INCOME	2,670	3,311	4,041	4,739	5,079	6,135
PROPRIETORS INCOME	12,817	13,460	14,721	18,308	18,653	18,926
FARM	817	353	506	1,192	1,153	787
NONFARM	12,000	13,107	14,215	17,116	17,500	18,139
BY INDUSTRY						
FARM	1,360	890	1,002	1,837	1,801	1,670
NONFARM	70,166	80,614	92,363	107,352	110,980	122,704
PRIVATE 3/	55,961	64,844	74,971	86,526	86,626	94,754
MANUFACTURING	22,388	25,728	30,578	34,108	32,363	35,788
MINING	(D)	(D)	(D)	723	807	728
CONTRACT CONSTRUCTION	3,087	4,081	5,219	5,958	6,746	6,878
WHOLESALE AND RETAIL TRADE	14,540	17,006	18,774	21,590	21,507	24,372
FINANCE, INSURANCE, AND REAL ESTATE	2,143	2,466	2,938	3,172	3,320	3,732
TRANSP., COMM. + PUBLIC UTILITIES	4,000	4,545	5,434	6,212	6,715	7,373
SERVICES	8,825	9,603	10,551	12,888	14,063	14,786
OTHER INDUSTRIES	(D)	(D)	(D)	875	1,065	1,097
GOVERNMENT	14,205	15,770	17,392	20,826	24,354	27,950
FEDERAL, CIVILIAN	3,007	3,239	3,535	3,995	4,618	5,180
FEDERAL, MILITARY	433	487	553	564	765	821
STATE AND LOCAL	10,765	12,044	13,304	16,267	18,971	21,949
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE						
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	71,526	81,504	93,365	109,189	112,781	124,374
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	3,278	4,199	4,894	6,101	6,564	7,131
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	68,248	77,305	88,471	103,088	106,217	117,243
PLUS: RESIDENCE ADJUSTMENT	174	156	146	25	405	153
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	68,422	77,461	88,617	103,113	106,622	117,396
PLUS: DIVIDENDS, INTEREST, AND RENT	21,570	23,945	26,589	30,001	35,339	38,512
PLUS: TRANSFER PAYMENTS	21,755	25,412	28,513	34,153	43,552	52,940
PERSONAL INCOME BY PLACE OF RESIDENCE	111,747	126,818	143,719	167,267	185,513	208,848
PER CAPITA INCOME	3,112	3,292	3,704	3,922	4,114	4,478
TOTAL POPULATION (THOUSANDS)	35.9	38.5	38.8	42.6	45.1	46.6

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - OREGON EMPLOYMENT DIVISION
3/ (D) NOT SHOWN TO AVOID DISCLOSURE OF CONFIDENTIAL INFORMATION. DATA ARE INCLUDED IN TOTALS.

PER CAPITA INCOME RELATIVES BY SMSA'S, COUNTIES, AND INDEPENDENT CITIES, IN SELECTED YEARS, 1967-75

(RESIDENCE ADJUSTED)
PER CENT OF NATIONAL AVERAGE

	1967	1968	1969	1970	1971	1972	1973	1974	1975
OREGON	96	96	95	94	95	95	96	98	97
SMSA'S									
EUGENE-SPRINGFIELD, OR	84	86	84	84	85	85	86	86	85
PORTLAND, OR-WA	110	109	107	106	108	106	106	109	110
SALEM, OR	87	87	87	87	88	89	92	94	92
COUNTIES									
BAKER	86	82	81	83	82	86	81	79	78
BENTON	85	86	82	77	80	74	77	77	76
CLACKAMAS	107	105	104	104	110	112	110	113	114
CLATSOP	105	98	92	93	94	94	92	94	96
COLUMBIA	99	81	80	81	82	84	86	92	98
COOS	92	88	84	84	82	92	84	84	85
CROOK	88	86	86	88	89	91	95	96	92
CURRY	85	81	79	76	80	84	85	82	81
DESCHUTES	91	86	86	90	92	94	92	88	90
DOUGLAS	76	84	82	81	84	88	85	85	84
GILLIAM	110	100	96	93	119	111	121	170	139
GRANT	89	95	92	87	82	93	85	80	81
HARNEY	90	84	83	86	92	92	90	89	90
HOOD RIVER	103	92	99	96	103	100	115	115	111
JACKSON	82	83	80	81	85	86	84	85	83
JEFFERSON	77	70	76	73	71	83	91	108	89
JOSEPHINE	74	75	75	78	78	82	78	75	76
KLAMATH	91	88	87	89	88	88	90	94	87
LAKE	97	91	88	86	86	81	86	84	82
LANE	84	86	84	84	85	85	86	86	85
LINCOLN	85	81	78	80	78	82	81	84	85
LINN	76	77	79	77	76	78	80	83	80
MALHEUR	82	79	82	82	79	87	101	102	90
MARION	91	90	90	90	92	93	94	96	95
MORROW	87	82	87	82	87	120	125	179	215
MULTNOMAH	114	113	112	110	112	108	109	113	114
POLK	69	71	74	74	73	73	81	84	78
SHERMAN	112	119	120	101	107	118	127	157	144
TILLAMOOK	89	86	82	80	81	82	85	81	82
UMATILLA	93	93	89	86	86	91	94	100	95
UNION	86	77	79	83	84	84	87	87	82

U.S. Dept. of Commerce, Regional Economics Information System, Bureau of Economic Analysis, Washington, D.C. May 1977

PER CAPITA INCOME RELATIVES BY SMSA'S, COUNTIES, AND INDEPENDENT CITIES, IN SELECTED YEARS, 1967-75

(RESIDENCE ADJUSTED)
PER CENT OF NATIONAL AVERAGE

	1967	1968	1969	1970	1971	1972	1973	1974	1975
OREGON - COUNTIES (CONTINUED)									
WALLOWA	82	77	79	79	78	89	89	86	85
WASCO	84	90	89	91	92	93	96	110	104
WASHINGTON	107	104	106	104	103	103	105	108	107
WHEELER	89	80	76	72	77	82	85	81	67
YAMHILL	77	79	80	80	80	82	86	87	85

U.S. Dept. of Commerce, Regional Economics Information System, Bureau of Economic Analysis, Washington D.C. May 1977

APPENDIX L

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APPENDIX T

GLOSSARY OF TERMS

A-weighted sound scale - A sound scale with sound pressure level deemphasizing lower frequencies and slightly emphasizing frequencies between 1000 and 5000 Hz. The A-weighting curve is designed to simulate the human hearing mechanism's frequency response.

acquired lands - Lands, or interest in lands, purchased by the United States and managed as public lands.

allowable cut - The amount of forest products that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

allowable cut effect (ACE) - The immediate increase in today's allowable cut which is justified by expected future increases in yields due to present or proposed management treatments.

allowable cut planning system - A process which deals with the steps involved in the development and evaluation of alternative levels of timber production for the purpose of establishing an allowable cut.

anadromous fishes - Fishes which migrate from the sea to breed in fresh water. Their offspring return to the sea.

angler day - A fisherman day as defined by the Oregon Department of Fish and Wildlife is any angler visit during one day.

animal unit - One mature cow, one horse, five sheep, six deer, or equivalent numbers of other herbivorous species.

animal unit month (AUM) - The amount of forage (of any combination of vegetative species) necessary for the subsistence, in a healthy state, of one mature cow (and calf under six months) for a period of one month.

AQCR - Air quality control region, State of Oregon.

AQMA - Air quality management area, State of Oregon.

archeology - The scientific discipline responsible for recovering, analyzing, and interpreting the unwritten portion of man's historic and prehistoric method, thus contributing to our understanding of the present and to our ability to prepare for the future.

archeological resources - All evidences of past human occupations other than historical documents, which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental data, and all other relevant information.

aspect - The direction a slope faces.

average employment - The sum of number of employees, reported monthly, divided by twelve. Because employment is reported for all employees working during any one month, it is a modest over-estimate of full-time equivalent employment.

avian - Pertaining to birds.

biome - A biotic community which covers an extensive geographic area with characteristic life forms and climax species of plants and animals. Sub-biomes are minor geographic divisions within a biome.

biotic community - Any assemblage of populations (both plant and animal) living in a prescribed area or physical habitat.

board foot - A unit of solid wood, one foot square and one inch thick.

bucking - Cutting trees into log lengths.

Bureau planning system - A process used in the BLM to establish land use allocations, constraints and objectives for various categories of public land use.

chain - A unit of length equal to 66 feet.

Class I Streams - Waters designated by the State of Oregon as valuable for domestic use, important for recreation or significant for the reproduction of fishes.

Class II Streams - Waters designated by the State of Oregon as headwater streams or minor drainages that generally are of limited or no value for fishing or other forms of recreation.

Class II Inventory - A cultural resource inventory based upon the identification and evaluation of all cultural resources in a portion of an area which will permit an estimate of the nature and distribution of cultural resources of the entire area.

Class III Inventory - An intensive field inventory designed to identify and evaluate, from surface and exposed profile indications, all cultural resource sites within a specified area (usually a project area).

clearcutting - A method of timber harvesting in which all trees, merchantable or unmerchantable, are cut from an area.

climatic climax community - A climatic climax community is one in which the community is in equilibrium with the general climate.

climax community - The final community which develops following a successional series. Theoretically, the climax community represents an equilibrium between community production and consumption.

coefficient of variation - A measure of variability that is expressed in percentage terms (it is independent of magnitude): It is the standard deviation of the variable divided by the mean for the variable.

commercial forest land - Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species.

commercial thinning - Removal of merchantable surplus trees.

community income effect - The sum of direct and indirect personal income generated by a change, e.g., timber harvest. Indirect personal income results from economic activity stimulated in other local enterprises by purchase of goods and services, primarily of a support nature.

contrast rating - A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature.

covered employment - As reported by the State of Oregon Employment Division for employees "covered" by the State Unemployment Insurance Law, excludes self-employment, agricultural, domestic, and other laborers whose employment is occasional or compensation is by commission.

cull - A tree or log which is rejected because it does not meet certain specifications.

decibel (dB) - A logarithmic measure of sound pressure.

DEQ - Department of Environmental Quality, State of Oregon.

discharge - Rate of flow, specifically fluid flow; a volume of fluid passing a point per unit of time, commonly expressed as cubic feet per second, mission gallons per day, gallons per minute, or cubic meters per second.

ecosystem - An ecological unit consisting of both living and nonliving components which interact to produce a natural, stable system.

ecotone - The transition zone between two adjacent communities.

environmental assessment report (EAR) - A systematic environmental analysis of site specific BLM activities. Used to determine whether such activities have a significant affect on the quality of the human environment and whether a formal environmental statement is required.

environmental statement (ES) - A formal document to be filed with the Environmental Protection Agency which considers environmental impacts to be expected from implementation of a significant Federal proposal.

falling/felling - Cutting down trees.

fauna - All the animals in a given area.

final harvest cut - Constitutes removal of a mature stand; either through clear cutting, the final stage of a shelterwood regime, or overstory removal.

fire-induced community - A plant community which develops following fire. The community may be dominated by individuals which are resistant to fire or by young plants which have sprouted following fire.

fire-dependent ecosystem - An ecosystem kept at a permanent stage of disclimax by fire disturbance.

flora - All the plants in a given area.

forbs - Herbaceous plants. Most often used pertaining to herbaceous plants eaten by wildlife.

forest land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and has not been developed for non-timber use.

forest management program - Includes timber activity plan and all forest resource related program activity plans.

frequency - The number of oscillations per second of a sound; pitch. A sound can, of course, contain more than one frequency.

gross yarding - yarding unmerchantable logging residue to the concentration points.

groundwater - Phreatic water or subsurface water in the zone of saturation.

growing stock - The amount of standing, green timber retained to produce forest products. Also known as forest capital.

habitat - The environment in which an organism occurs.

hertz - A measure of sound frequency equal to one cycle per second.

high intensity forest management lands - All commercial forest land that is part of the timber production base for allowable cut calculation in the Josephine Sustained Yield Unit.

indicator plant species - A plant that, by its occurrence, vigor or frequency, indicates a particular property of a site. Soil type generally, but not exclusively, is the controlling site factor.

intermediate cuttings - Any removal of merchantable trees from a stand which occurs prior to the final harvest cutting,i.e., commercial thinning, sanitation/salvage, or shelterwood regeneration cuttings.

instant wilderness study area - One of 55 primitive or natural areas formally identified prior to November 1, 1975. These areas are subject to wilderness study reports to be submitted by July 1, 1980.

international log rule - A log rule derived from a formula which allow a 1/2-inch taper for each 4 feet of log length and 1/16-inch shrinkage for each one-inch board. In one form it assumes a 1/8-inch saw kerf (International 1/8-inch Log Rule) and in a modified form it assumes a 1/4-inch saw kerf (International 1/4-Log Rule).

inversion (temperature) - The state of the atmosphere in which a layer of cold air is trapped near the earth's surface by an overlaying layer of warm air; may contribute to serious air pollution problems.

invertebrate - An animal without a segmented bony or cartilaginous spinal column. (Arthropods and lower phyla).

labor force/population ratio - is the quotient of labor force for a county as reported by the State of Oregon Employment Division, divided by population, as reported by Portland State University Center for Population Research and Census. The ratio is used in inferring average resident population dependent upon each job.

landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

landscape character - The arrangement of a particular landscape as formed by the variety and intensity of the basic elements of form, line color and texture.

latitudinal migration - A form of animal movement which involves a change of latitude. Latitudinal migration may traverse any distance from a few miles to nearly trans-polar (as is the case with some species of birds).

log flows - destinations of harvested timber by origin. Origins used herein are management units (e.g., Josephine Sustained Yield unit) and counties or county groupings. Destinations are communities, counties or groupings of counties within which the primary processing of timber takes place.

log rule - A procedure for estimating the board foot volume of logs of given length and diameter.

low intensity forest management lands - Commercial forest lands withdrawn from the timber production base since the regeneration period is expected to exceed five years. Included in the proposal for trial harvest.

lumber on wood products, except furniture - Defined by the Office of Management and Budget the Standard Industrial Classification Manual as Major Group #24, which includes logging contractors engaged in cutting timber and pulpwoods; merchant sawmills, lath mills, shingle mills, planing mills, plywood mills and veneer mills engaged in producing limber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are classified in Major Group #25.

Management Framework Plan (MFP) - Land use plan for public lands which provides a set of goals, objectives and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

migrant bird (transient) - A species which is ephemerally present only during migration and neither breed nor winter in the area.

morphology - The structure and form of an organism.

mortality-salvage - (see sanitation/salvage cutting).

multiple use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

National Register of Historic Places (National Register) - Established by the Historic Preservation Act of 1966, the Register is a listing maintained by the National Park Service of architectural, historical, archeological, and cultural sites of local, state or national significance. Sites are nominated to the Register by the states and by Federal agencies. Copies of the National Register are available from the Superintendent of Documents, U.S.G.P.O., Washington, D.C. 20402.

niche - The position or status of an organism within its community and ecosystem.

non-commercial forest land - Land which is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species, or land which is capable of producing only non-commercial tree species.

non-forest land - Land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

octave band sound pressure level - The sound pressure level of that portion of the total sound which lies between a band of frequency whose highest component is double that of the lowest frequency component, for example, 707 and 1414 Hertz.

operations inventory - An intensive forest inventory which provides managers with information showing the location, acreage, silvicultural needs, mortality-salvage or thinning needs within each section of public land.

paleontology - A science dealing with the life of past geological periods as known from fossil remains.

paper & allied products - This major (S.I.C.) group includes the manufacture of pulps from wood and other cellulose fibers; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products such as paper bags, paper boxes, and envelopes.

partial cutting - Tree removal other than by clearcutting.

permeability - The capacity to transmit a fluid, measured by the rate of movement of a fluid of standard viscosity through material in a given interval of time under a given hydraulic gradient.

permeability (of soil) - The quality of a soil horizon that enables water or air to move through it. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

personal income - The income received by all individuals in the economy from all sources. It is made up of wage and salary disbursements, proprietors income, rental income of persons, dividends, personal interest income, and the difference between transfer payments and personal contributions for social insurance.

phytoplankton - Suspended, floating or weakly swimming microscopic aquatic plants.

Planning Area Analysis (PAA) - A planning document which analyzes the relationship of social and economic data to the physical and biological data presented in a Unit Resource Analysis (URA).

plant community - An association of plants. Plants of various species are found growing together in different areas with similar site characteristics.

precommercial thinning - Removal of surplus trees in a stand prior to their reaching merchantable size.

public lands - Any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management. May include public domain, O&C, or acquired lands in any combination.

public domain lands - Original holdings of the United States never granted or conveyed to other jurisdictions.

recharge - Process by which water is added to the zone of saturation, as in recharge of an aquifer.

reforestation - Reestablishment of a tree crop on forest land.

regeneration - The renewal of a tree crop, whether by natural or artificial means. Also, the young crop itself.

regeneration cut - One of the phases of shelterwood cutting designed to open the canopy of a stand sufficiently to allow the establishment of regeneration, i.e., either the first stage of a two-stage shelterwood cutting or the second stage of a three-stage shelterwood cutting.

regeneration period - The time it takes for a new coniferous timber stand to become established following the final harvest cut.

riparian - Pertaining to natural communities which develop on or near the banks of a body of water.

sanitation/salvage cutting - Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees likely to die prior to final harvest cut so as to utilize merchantable material.

savanna - A grassy expanse with scattered clumps of trees.

sawlog - A log considered suitable in size and quality for producing sawn timber.

SCA - Special Control Area, State of Oregon

scarification - Disturbance of the upper soil layer by mechanical means in preparing a site for seeding or planting.

scenic quality - The quality of the scenery as determined through the use of the scenic evaluation process.

Scribner Decimal C Log Rule - A derivation of the Scribner Log Rule whereby volumes are rounded to the nearest ten board feet and are listed in tens of board feet (volumes given in a table of this rule must be multiplied by 10 to obtain the actual board foot content).

Scribner Log Rule - A log rule constructed from diagrams which show the number of 1-inch boards which can be drawn in a circle representing the small end of a log. The Scribner rule assumes a 1/4-inch saw kerf, makes a liberal allowance for slabs, and disregards taper.

sensitivity level(s) - An index of the relative importance or volume of visual response to an area in relation to other areas in the planning unit.

shelterwood cutting - A series of partial cuttings designed to establish a new crop of trees under the protection of the old.

silviculture - The art of producing and tending a forest.

site class - A measure of the relative productive capacity of an area for timber or other vegetation.

slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

snag - A standing dead tree from which the leaves and most of the branches have fallen.

soil - The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

soil mapping unit - A kind of soil, a combination of kinds of soil, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes and objectives of the survey. Soil mapping units are the basis for the delineations of a soil survey map.

State Historic Preservation Office (SHPO) - Position established to review ES′s within every state; also maintains a register of historic sites (including archeological) for the State and advises state land management agencies on archeological matters.

succession - The orderly process of community change. The process by which one plant community will succeed another over time given the same climatic conditions.

summer resident bird - Bird species present during the warmest time of the year, which generally includes the breeding season. Summer residents may stay within an area from early spring through late autumn.

sustained yield - The yield that a forest can produce continuously at a given intensity of management.

sustained yield unit (SYU) - A geographic area for which an allowable cut is determined providing for continuous, undiminishing flow of timber at a given intensity of management.

texture (soil) - The relative proportion of sand, silt, and clay (expressed as percentages) in a soil expressed in terms of standard classes and subclasses in the USDA Soil Survey Manual.

timber activity plan - A plan which deals specifically with the implementation of the approved allowable cut.

timber production base - Acres included in the calculation of the allowable cut (see high intensity forest management lands).

Timber Production Capability Classification (TPCC) - A classification system that identifies the commercial forest land base capable of producing timber on a sustained yield basis.

true fir - A member of the genus Abies, for example white fir (Abies concolor); Douglas-fir (Pseudotsuga menziesii) is not a true fir.

understory species - Shade-tolerant plant species which characteristically grow beneath the forest canopy. Examples include blackberry and rhododendron.

unit resource analysis (URA) - A BLM planning document which contains a comprehensive inventory and analysis of the physical resources and an analysis of their potential for development, within a specified geographic area.

vegetative stratification - The "layered" appearance of a natural vegetative community. For example, a normal forest community will have a ground-level layer of grasses and herbs, an intermediate-level layer of shrubs and a canopy layer of trees.

vertebrate - An animal with a segmented bony or cartilaginous spinal column (mammals, birds, amphibians, reptiles).

visual contrast - The effect of a striking difference in the form, line, color, or texture of an area being viewed.

visual resource - The land, water, vegetation, animals and other features that are visible on all public lands.

Visual Resource Management (VRM) - Management of the visual landscape.

visual resource management classes - The degree of alteration that is acceptable within the characteristic landscape. It is based upon the physical and sociological characteristics of any given homogeneous area.

visual zones - The area that can be seen from a location and classified as foreground, middleground, background or seldom seen.

water quality, biological - The content of bacteria and other microorganisms in water. Often measured as counts of most probable number (MPN) based on statistical principles.

water quality, chemical - The content of dissolved or suspended matter, mostly solids, although dissolved gases may be important locally.

watershed - The area drained by a given stream.

winter resident bird - A bird species present only during the winter (non-breeding) season.

yarding - The initial haul to a loading point, i.e., transporting timber from the stump to a landing.

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Form 1279-3
(June 1984)

BORROWER'S

SD 538.2 .07 J67 1978
Josephine Sustained Yiel
Unit ten-year timber

DATE LOANED	BORROWER

USDI - BLM

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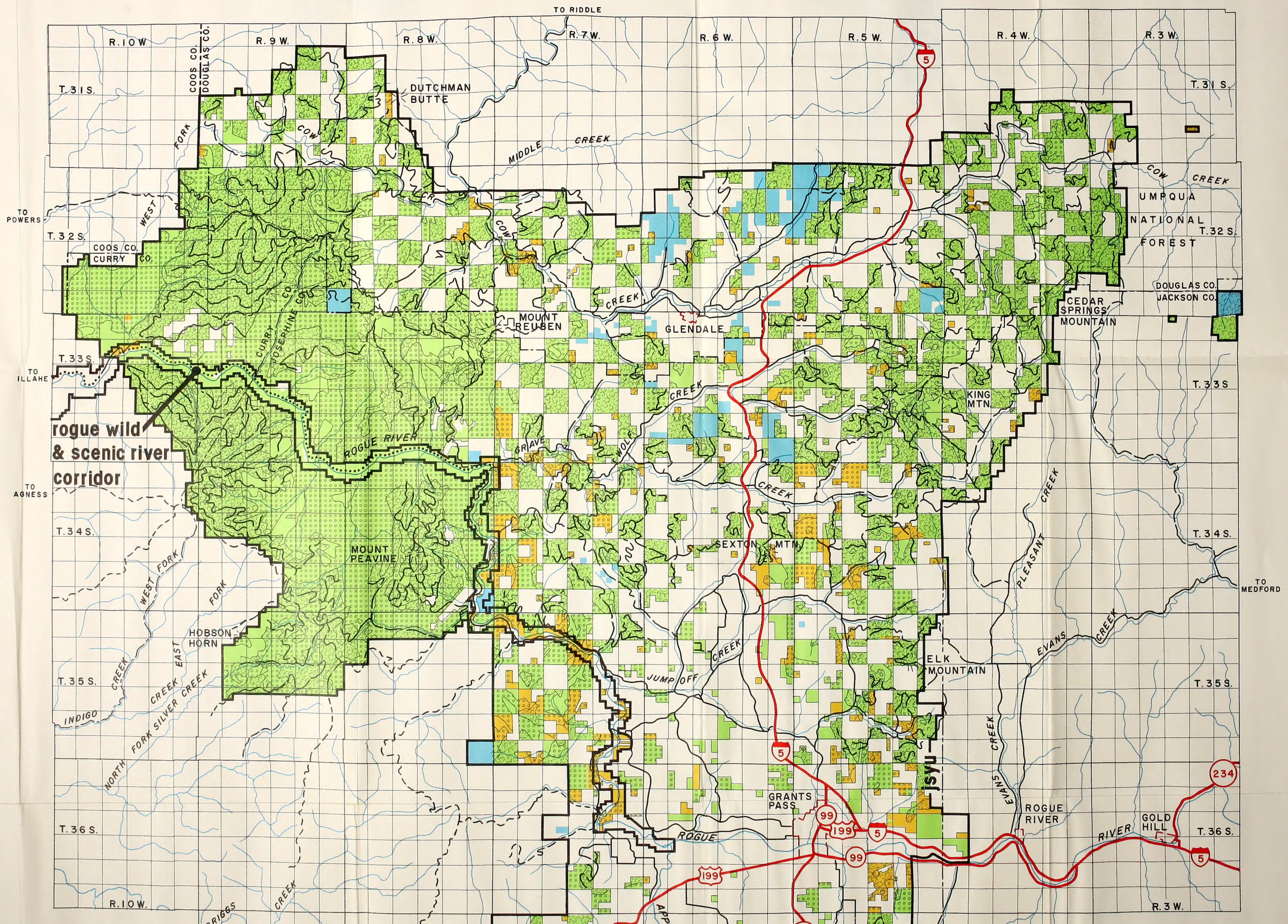
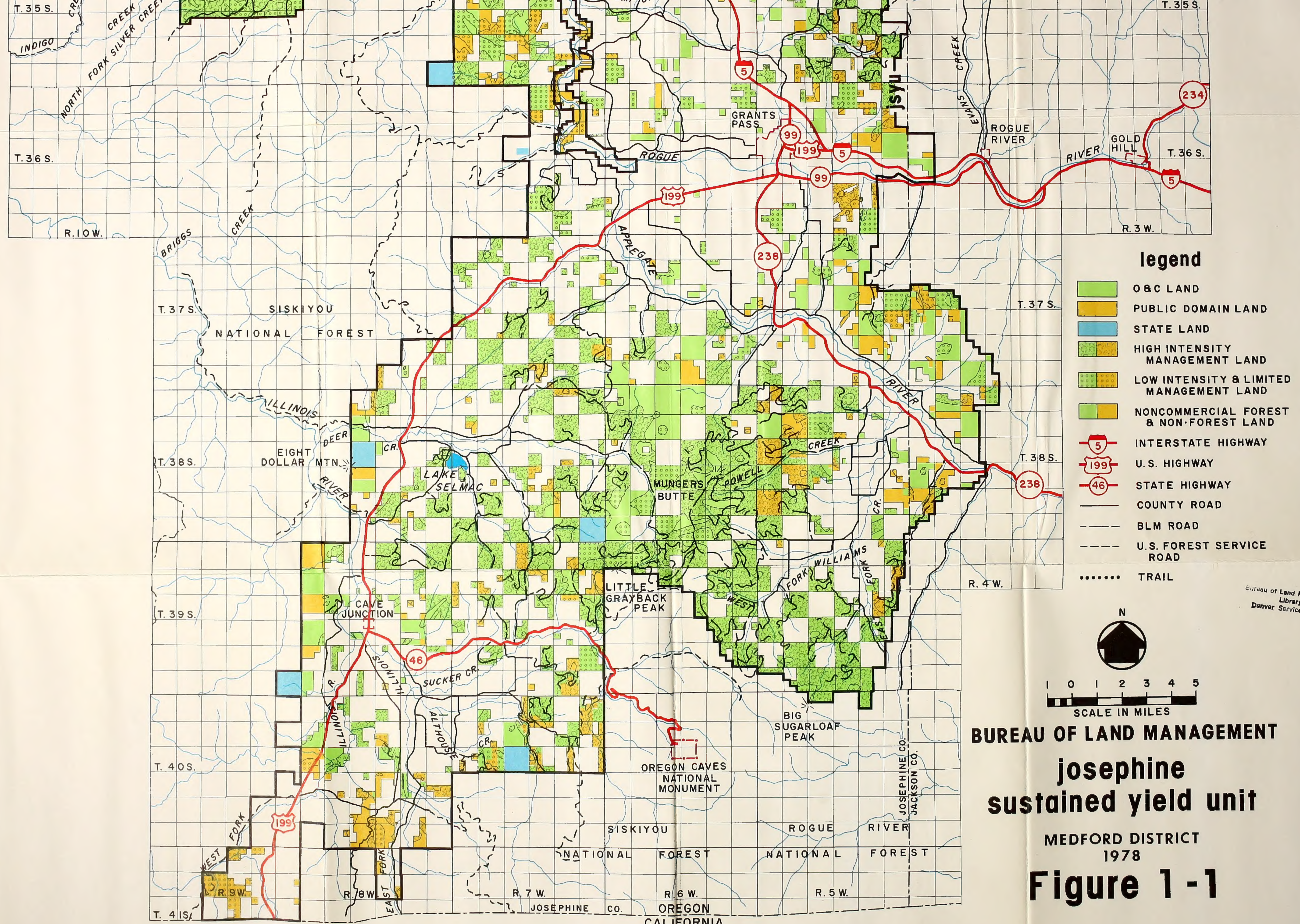


TO RIDDLE
R.10W.
R.9W.
R.8W.
R.7W.
R.6W.
R.5W.
R.4W.
R.3W.
COOS CO.
DOUGLAS CO.
T.31S.
T.31S.
DUTCHMAN
BUTTE
MIDDLE
CREEK
COW
FORK
WEST
TO
POWERS
T.32S.
COOS CO.
CURRY CO.
CR.
COW
COW
CREEK
UMPQUA
NATIONAL
FOREST
T.32S.
DOUGLAS CO.
JACKSON CO.
CEDAR
SPRINGS
MOUNTAIN
MOUNT
REUBEN
GLENDALE
CREEK
CURRY CO.
JOSEPHINE CO.
T.33S.
TO
ILLAHE
T.33S
CREEK
KING
MTN.
rogue wild
& scenic river
corridor
ROGUE RIVER
GRAVE
WOLF
CREEK
CREEK
TO
AGNESS
T.34S.
T.34S.
SEXTON MTN.
MOUNT
PEAVINE
PLEASANT
WEST FORK
FORK
TO
MEDFORD
HOBSON
HORN
EAST
CREEK
EVANS
CREEK
JUMP OFF
CREEK
ELK
MOUNTAIN
T.35S.
CREEK
T.35S.
CREEK
SILVER CREEK
INDIGO
NORTH FORK
CREEK
EVANS
5
234
GRANTS
PASS
ISYU
ROGUE
RIVER
GOLD
HILL
T.36S.
99
199
5
RIVER
T.36S.
ROGUE
99
5
199
R.10W.
BRIGGS
CREEK
APP
R.3W.



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josephine sustained yield unit

MEDFORD DISTRICT
1978

Figure 1-1

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